Proceedings of the
American Association of Textile Chemists and Colorists

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Editor of Proceedings: **Carl Z Draves, 30 Lahey St, New Hyde Park, N Y**

FEBRUARY 16, 1953

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CALENDAR

AATCC

COUNCIL
April 17, June 5.

GENERAL RESEARCH COMMITTEE
March 12

NATIONAL CONVENTIONS
September 17-19, 1953 (Hotel Conrad Hilton, Chicago); 1954 (Atlanta, Ga); Sept 21-23, 1955 (Chalfonte-Haddon Hall, Atlantic City, N J).

HUDSON-MOHAWK SECTION
March 20, May 8 (Albany); June 19 (Outing).

MID-WEST SECTION
April 18 (Netherland Plaza, Cincinnati, O); June 20 (Outing, Lake Delavan, Wis); November 7 (Hotel Bismarck).

NEW YORK SECTION
February 27 (Hotel Statler, New York, N Y); April 17, May 22 (Swiss Chalet); June 19 (Outing, North Jersey CC, Wayne, N J).

NORTHERN NEW ENGLAND SECTION
Mar 6 (MIT Faculty House, Cambridge); April 17 (Lowell Textile Inst, Lowell); May 15 (Andover CC, Andover); June 12 (Annual Outing); Nov 6 (LTI); Dec. 4 (MIT Faculty House).

PHILADELPHIA SECTION
Mar 6 (Kugler's Restaurant, Phila); April 24; May 22 (Outing, Manufacturer's Golf & Country Club); Sept 11; Oct 23; Dec 4; Jan 15, 1954.

PACIFIC SOUTHWEST SECTION
April 24 (Nikabob Cafe, Los Angeles).

PIEDMONT SECTION
April 11, (Robert E Lee Hotel, Winston-Salem, N C); June 12-13 (Mayview Manor, Blowing Rock, N C); Sept 12 (Hotel Charlotte, Charlotte, N C).

RHODE ISLAND SECTION
Feb 22 (Johnson's Grill, Providence); Mar 27 (Providence Eng Soc); Apr 24 (Wannamoisett C C); May 22 (Prov Eng Soc); June 12 (Outing, Wannamoisett C C); Oct 23 (Prov Eng Soc); Dec 4 (Annual Meeting, Sheraton - Biltmore, Providence).

SOUTH CENTRAL SECTION
Feb 28, May 23 (Patten Hotel, Chattanooga, Tenn); Aug 21-22 (Outing, Chattanooga Golf & Country Club, Chattanooga, Tenn); Dec 5 (Patten Hotel).

WESTERN NEW ENGLAND SECTION
Mar 20 (Rapp's Restaurant, Shelton, Conn); May 8 (Ladies Night); June 19 (Outing); Oct 2, Nov 6 and Dec 11 (Rapp's).

OTHER EVENTS

AMERICAN CHEMICAL SOCIETY
123rd National Meeting, March 16-20, Los Angeles, Calif. Textile Symposium (sponsored by the Chemical Marketing and Economics Division), March 18, Hotel Statler, Los Angeles, Calif.

AMERICAN OIL CHEMISTS' SOCIETY
44th Annual Meeting, May 4-6, Roosevelt Hotel, New Orleans, La; 27th Fall Meeting, November 2-4, Sherman Hotel, Chicago, Ill.

AMERICAN SOCIETY FOR QUALITY CONTROL
Textile Division: May 27-29, Convention Hall, Philadelphia, Pa.

AMERICAN SOCIETY FOR TESTING MATERIALS
Committee D-13 on Textile Materials: March 18-20, Park Sheraton Hotel, New York, N Y; 1953 Annual Meeting, June 29-July 3, Chalfonte-Haddon Hall, Atlantic City, N J.

AMERICAN TEXTILE MACHINERY ASSOCIATION
Exhibit of American Textile Machinery, April 26-May 1, 1954, Atlantic City Exhibition Hall, Atlantic City, N J.

ASSOCIATION OF CONSULTING CHEMISTS AND CHEMICAL ENGINEERS, INC
April 21 (Hotel Belmont Plaza, New York, N Y—Symposium and Dinner); Annual Meeting—25th Anniversary-October 27 (Hotel Belmont Plaza, New York).

CANADIAN ASSOCIATION OF TEXTILE COLOURISTS AND CHEMISTS (Quebec Section)
Feb 21, Mar 21 (Physical Science Centre, McGill Univ, Montreal, Que); April 17-18 (Annual Meeting, Mount Royal Hotel, Montreal, Que); June 20 (Annual Golf Tournament).

GARMENT DYERS GUILD OF AMERICA
1953 Technical Clinic, November, Steuewe Plant, Rochester, N Y.

NATIONAL ASSOCIATION OF HOSIERY MANUFACTURERS
41st Knitting Arts Exhibition, April 27-May 1, Atlantic City Auditorium, Atlantic City, N J.

NEW YORK BOARD OF TRADE (DCAT)
27th Annual Drug, Chemical and Allied Trades Dinner, March 5, Waldorf-Astoria, New York, N Y.
Drug, Chemical and Allied Trades Section; 63rd Annual Meeting, Sept 24-27, Pocono Manor Inn, Pocono Manor, Pa.

PHI PSI FRATERNITY
50th Convention, May 7-9, Penn-Sheraton Hotel, Philadelphia, Pa.

PENNSYLVANIA STATE COLLEGE, SCHOOL OF HOME ECONOMICS
Annual Spring Weekend, April 17-18, State College, Pa.

PURDUE INDUSTRIAL WASTE CONFERENCE
8th Conference, May 4-6, Purdue University Memorial Union Building, Lafayette, Ind.

SYNTHETIC ORGANIC CHEMICAL MANUFACTURERS ASSOCIATION OF THE UNITED STATES
March 11 — Hotel Commodore, New York; June 11-13 (Joint Outing with Manufacturing Chemists' Association at The Greenbrier, White Sulfur Springs, W. Va.

TEXTILE RESEARCH INSTITUTE
1953 Annual Meeting, Nov 12-13.

NOTICE TO SECRETARIES AND PUBLICITY CHAIRMEN OF LOCAL SECTIONS

Papers presented before local sections should be sent to Dr Carl Z Draves, Editor of the *Proceedings*, 30 Lahey Street, New Hyde Park, New York. Authors should provide two copies for this purpose.

Reports of local section meetings should be sent to the American Dyestuff Reporter with copies going to Dr H C Chapin, National Secretary.

Dates of meetings and advance notices of meetings should be sent to the American Dyestuff Reporter with copies also going to Dr Chapin. For publication in any particular issue, information should be in the office of the Reporter 17 days before the issuance date.

1953 NATIONAL CONVENTION

CONRAD HILTON HOTEL, CHICAGO, ILL.

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Pacific Southwest Section Meeting Report

January 21, 1953
Mona Lisa Restaurant, Los Angeles, Calif

THE Pacific Southwest Section attracted twenty-nine members and guests to the Mona Lisa Restaurant, Los Angeles, Calif, on January 16th for their first quarterly meeting of 1953. Chief speaker of the evening was H J Jordan, Rubber Chemicals Department, E I du Pont de Nemours & Co, Inc, who spoke on "Neoprene." Mr Jordan supplemented his talk with a colored film as well as a display of products made from Neoprene.

Edwin B Lindquist, Chairman of the Nominating Committee, presented the following list of candidates for Sectional offices:

Chairman—Sidney Springer
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Treasurer—Sergio Dadone
Councilor—Angus H Roberts
Sectional Committee—J Raymond Nehmens, Harry Smith, C Franklin Donyes, Henry Salomon

J R Nehmens was appointed Chairman of a newly-organized Program and Planning Committee.

Respectfully submitted,
ANGUS H ROBERTS, *Secretary*

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New York Section Meeting Report

January 30, 1953
Hotel Statler, New York, N Y

A meeting of the New York Section was held on Friday evening, January 30th, 1953 in the Georgian Room of the Hotel Statler, New York City. An informal dinner preceded the meeting.

The Chairman, Weldon G Helmus, announced that the 1953 Outing and Golf Tournament would be held on Friday, June 19th at the North Jersey Country Club. He introduced Dr Harold W Stiegler, AATCC Director of Research.

Dr J Fred Oesterling, Chief, Textile and Leather Division, Quartermaster Research and Development Laboratories, Philadelphia, Pa, presented a paper entitled "The Ideal Military Fabric" which was illustrated by slides.

The attendance was approximately 150.

Respectfully submitted,
NORMAN A JOHNSON, *Secretary*

January 10, 1953—Piedmont Section Meeting
Clemson College, Clemson, S C

(L to r): J Vaughn, Geigy Co, Inc, *afternoon speaker;* R Hobart Souther, Cone Mills Corp, *Councilor;* C O Stevenson, Ciba Co, Inc, *in charge of meeting;* M M McCann, Warwick Chem Co, *Chairman;* Neal A Truslow, U S Rubber Co, *Research Committee Chairman*

Piedmont Section Meeting Report

January 10, 1953
Clemson House, Clemson, S C

THE Winter Meeting of the Piedmont Section was held at the Clemson House, Clemson, S C, January 10, 1953.

A research meeting was held in the morning in the auditorium of the Textile Building, Clemson College. This meeting was presided over by Neal A Truslow of the U S Rubber Company of Winnsboro, S C. Forty-five members were in attendance.

The Technical Session was held in the afternoon in the Saber Room of the Clemson House and was opened by Tom Kitchen, who introduced the speaker, J Vaughn Boone, Geigy Company, Inc. Mr Boone's paper, entitled "Organic Sequestering Agents in Textile Wet Processing", was followed by a question and answer period. Approximately 125 members were in attendance.

A banquet was held in the evening with Audley H Ward of Aiken, S C speaking on "Human Relations".

C O Stevenson, Ciba Company, Inc, was in charge of arrangements.

Respectfully submitted,
CLARENCE HOOPER, *Secretary*

EMPLOYMENT REGISTER

This column is open for two insertions per year, per member, without charge. Blanks can be obtained from, and filed with, the Secretary of the Association, Lowell Textile Institute, Lowell, Mass. It is understood that these will be open to inspection by prospective employers who can obtain further information from the Secretary.

53-1

Education: Chemistry and Dyeing, Rhode Island School of Design

Experience: Overseer of dyeing; cotton, rayon and blends

Age: 45; married; references; northeastern U S preferred

2-16, 3-2

53-2

Education: PhD, organic chemistry; BS, textile chemistry

Experience: research for dye manufacturer

Age: 28; single; references; eastern U S preferred

2-16, 3-2

53-3

Education: BA, chemistry, with additional course in textile testing

Experience: Chemist for a bleachery and dyeworks now liquidated

Age: 62; single woman; references; Eastern Massachusetts preferred

2-16, 3-2

AATCC Research Laboratory Report——

FURTHER STUDY OF FACTORS INVOLVED IN MEASURING FLAMMABILITY OF CONSUMER TEXTILES

EDWIN P JOHNSTONE

Technical Manager, AATCC Research Labs, Lowell, Mass

INTRODUCTION

THE method for testing consumer textiles for their flammability characteristics, which has been suggested by the Flammability Committee of the American Association of Textile Chemists and Colorists as a guide in the production of clothing fabrics having a minimum of flammability hazard, has been the subject of further investigation. This method has been adopted by industry, has been approved by the American Standards Association, and has been the basis for promulgation of a Commercial Standard (CS191-53) by the U S Department of Commerce.

Modification of the AATCC Flammability Tester and a study of the reproducibility of the test method, as well as an investigation of the testing of chenille fabrics were reported previously *(1)*.

The present investigation included further study of some of the factors which may influence the precise measurement of flammability of clothing textiles. The effect of exposure to humid air for various periods of time after drying and before ignition of the test specimen was determined and was found to be considerable in some instances. Light pressure, such as might be encountered in handling napped, brushed, or pile fabrics, was found to decrease the burning rate to an extent that fabrics which would normally be classified as unsatisfactory were changed to a satisfactory classification.

Modification of the standard method to permit mounting the test specimens in the specimen holders after drying and cooling was found to influence the burning rate of fabrics which were known to absorb moisture very rapidly after drying. Further studies have included the effect on the burning rate on increasing the cooling time in the desiccator after oven-drying the test specimen.

DATA AND DISCUSSION

EFFECT OF EXPOSURE OF THE OVEN-DRIED AND COOLED SPECIMEN TO HUMID AIR—The per cent regain was determined by oven-drying at 105°C a weighed sample of the material, cooling, and weighing after oven-drying to obtain the oven-dry weight. The oven-dry sample was then exposed to air at 65% RH on the pan of an analytical balance and the increase in weight due to moisture pick-up was determined throughout a time cycle. The percentage regain was then calculated and plotted.

All specimens tested for burning time in comparison with per cent regain were conditioned at 65% RH—70°F. Specimens were prepared, dried for 30 minutes at

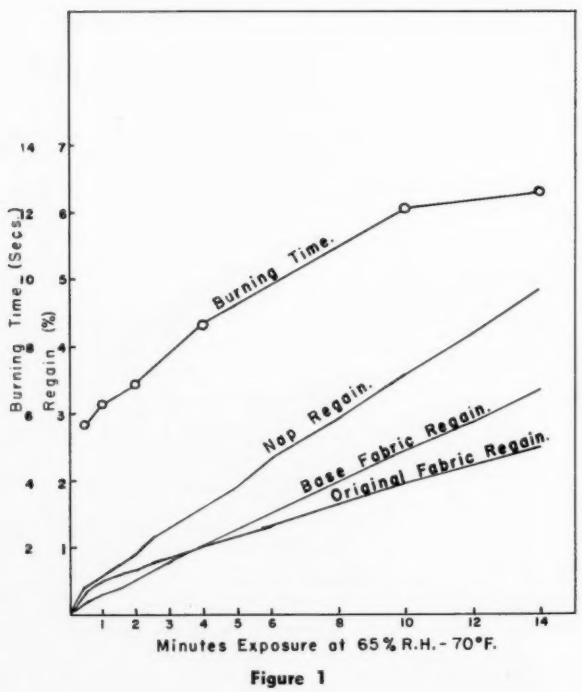

Figure 1

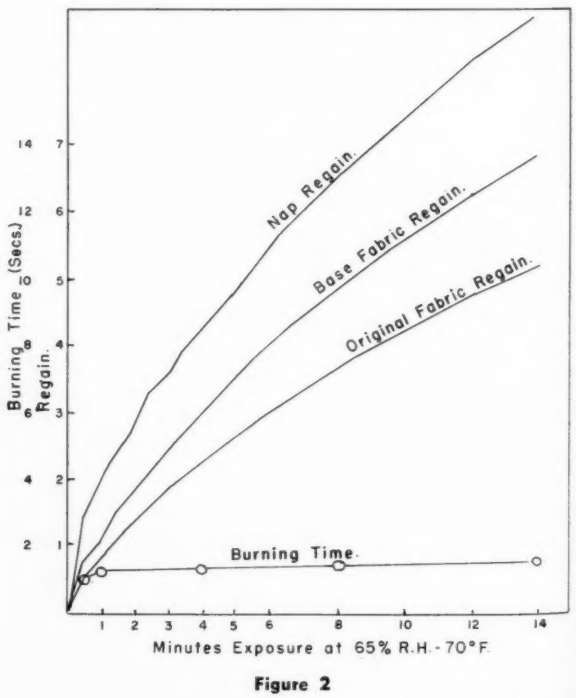

Figure 2

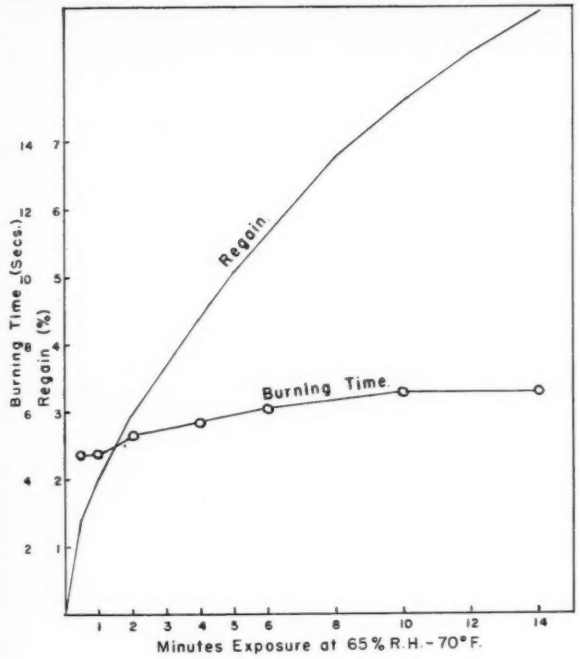

Figure 3

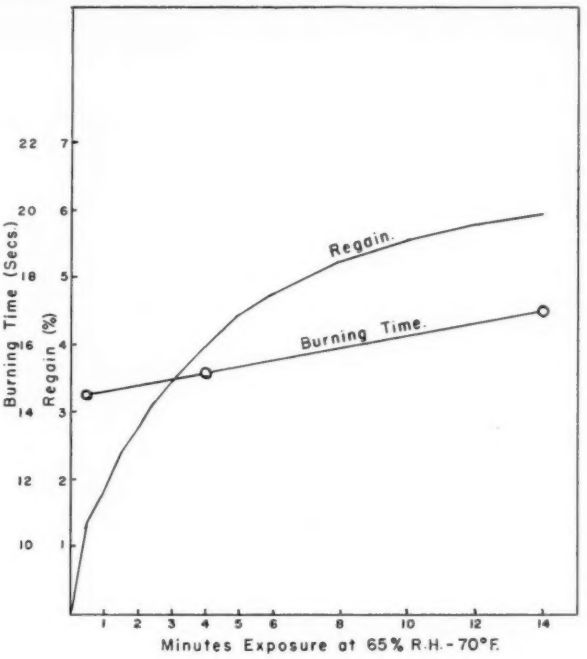

Figure 4

105°C, removed from the oven and cooled over $CaCl_2$ in a desiccator to room temperature. The specimens were then removed from the desiccator, mounted in the metal specimen holders and exposed to humid air at 65% RH—70°F for various lengths of time between removal from the desiccator and ignition of the specimen.

A blue brushed knit rayon fabric (special test fabric, not sheared) was found to be very sensitive upon exposure to humid air, the burning time increasing rapidly with increasing exposure. The burning time was compared with the per cent regain or moisture pick-up of the original fabric. Determinations of the per cent regain of the nap alone, and the base fabric alone, were compared with that of the original fabric (Fig. 1). It was noted that the fluffy loose fiber of the nap and the open knit construction of the base fabric permit greater access of the humid air to the individual fibers resulting in a higher rate of regain than that obtained with the dense, closely packed fiber of the original fabric. It is logical that the individual surface fibers standing above the dense mass of fibers in an unsheared nap will absorb moisture at a faster rate resulting in a decreasing tendency of the surface fibers to exhibit surface flash burning.

A brown brushed-knit fabric from a so-called "explosive" sweater was found to be not so sensitive to exposure to humid air at 65% RH as was the special test fabric mentioned above. The rate of regain was found to be faster but the fabric had such a long brushed nap that only flash burning was obtained throughout the series of tests. This fabric was of such a dangerous nature that any decrease in the flash burning after exposure to humid air for 14 minutes was very slight (Figure 2).

Figure 3 shows the results obtained on a Leno-weave rayon marquisette fabric. Due to its open-weave construction, this fabric regained moisture rapidly on exposure to humid air after oven-drying and the absorbed moisture had only slight effect on the burning time.

A comparison of moisture content with burning time of a cotton muslin (Figure 4) shows that this fabric is not sensitive to regained moisture, the burning time increasing only 2½ seconds after 14 minutes exposure to humid air. (This fabric required an ignition time of 5 seconds instead of the standard 1 second ignition period to ignite the fabric.)

EFFECT OF LIGHT PRESSURE ON THE SURFACE FIBERS OF A BRUSHED KNIT RAYON FABRIC——Conditioned specimens of the brown brushed knit rayon fabric from an "explosive" sweater, brushed once against the lay of the nap, were dried for 30 minutes at 105°C and cooled over $CaCl_2$ in a desiccator for 15 minutes at 70°F. The oven-dry swatches were then subjected to a load of 20 g/sq in in the desiccator for 1, 2, 3, 5, 10, 30, and 60 minutes. The load was removed and the specimens were mounted in the metal frames at 70°F and ignited 45 seconds after removal from the desiccator. This brushed fabric burned normally in the test with a rapid surface flash (1.4 seconds). When the load of 20 g/sq in had been applied for more than 5 minutes the surface fibers were pressed to such an extent that the surface flash no longer occurred, and the fabric could no longer be classified as a Class III (dangerous) fabric in the test.

It is evident that test specimens should not be subjected to handling after they have been brushed in the preparation for testing. Specimens should not be allowed to come in contact with each other in the oven during drying nor in the desiccator during cooling. If it should be necessary to remove or mount the specimens in the metal frames during preparation prior to the ignition, care should be exercised at all times to handle the brushed test specimens of napped or pile fabrics only by the extreme side or top edges to prevent flattening of the raised surface fibers. Failure to exercise this caution could result in significant variation in the results obtained on fabrics with a raised fiber surface between operators and between laboratories.

EFFECT OF COOLING IN THE DESICCATOR FOR VARIOUS PERIODS OF TIME AFTER DRYING——A series of tests was carried out on several fabrics

to determine if the length of time of cooling in the desiccator and the temperature of the swatch at the moment of ignition significantly influences the burning time. Specimens dried for 30 minutes at 105°C were tested immediately upon removal from the oven (hot); after 15 minutes cooling in the desiccator (warm); and after cooling in the desiccator for 1 hour and 24 hours (cool—70° F). No appreciable differences were noted in the results obtained with the fabrics tested.

COMPARISON OF THE AATCC STANDARD FLAMMABILITY METHOD WITH A MODIFIED METHOD—— In the Standard Method, the specimen is mounted in the metal specimen holder before drying and cooling. A modified method was considered in which the specimen would be mounted in the metal specimen holder after drying and cooling. It was found that the special test fabric (blue brushed knit rayon) had an average burning time 1.4 seconds longer using the modified method. It had previously been determined that this fabric is extremely sensitive to moisture pickup. Burning times of 5.6 and 6.3 seconds had been obtained after 0.5 minute exposure and 1 minute exposure respectively to humid air at 65% RH. Since the modified method of mounting the specimen after cooling entailed a longer exposure to the humid air (the Standard Method permitted removal from the desiccator and immediate placing of the mounted specimen in the test chamber), the difference in burning time between the two procedures appeared to be due primarily to the extreme sensitivity of this fabric to humid air.

SUMMARY

Information to date on flammability of clothing textiles indicates that the following factors in the preparation of the test specimen have little, if any, effect on the burning rate: drying time, if at least 15 minutes at 105°C; temperature of the oven-dried specimen at the moment of ignition; and length of cooling time in the desiccator.

Factors which may influence considerably the burning time (other than variation of the fabric itself) are: the moisture content due to exposure of the oven-dried specimen to humid air before ignition; and, in the case of napped or brushed fabrics, pressing down of the surface fibers due to improper handling of the test specimen during preparation of the specimen. Sensitivity of some fabrics to these factors could result in significant differences obtained between laboratories.

REFERENCE

(1) *Am Dyestuff Reptr* 39, No 6, p 197 (1950)

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Philadelphia Section Meeting Report

January 16, 1953

Kugler's Restaurant, Philadelphia, Pa

THE first meeting of 1953 of the Philadelphia Section was held on Friday, January 16th at Kugler's Restaurant, Philadelphia.

Chairman Harry L Morgan, James Lees and Sons Company, presented outgoing Chairman E C Diehl, Ankokas Dyeing & Processing Co., with a pair of travelling bags on behalf of the members. He then introduced the following officers and committee chairmen for 1953:

Vice Chairman—Frederick V Traut, Globe Dye Works Co

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Secretary—Thomas J Scanlon, Calco Chemical Division

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The speaker of the evening was Dr M J Reider, Industrial Consultant, who presented the 1952 Philadelphia Section Intersectional Contest Paper, "The Stripping of Color from Hydrophobic Fibers". A question-and-answer period followed with the following panel answering submitted questions: Arthur W Etchells, Hellwig Dyeing Corp (nylon and acetate); Richard B Stehle (dynel); Jackson Bauer, Fred Whitaker Co (Saran); William S Scollenberger (Acrilan); Donald E Gamble, E I du Pont de Nemours & Co, Inc (Orlon and Dacron); and James E Conway, Calco Chemical Division (X-51).

Approximately 135 members and guests attended dinner, with a total of over 160 at the technical meeting.

Respectfully submitted,
THOMAS J SCANLON, *Secretary*

1952 Intersectional Contest First Prize Winner——

PRINTING ACRYLIC AND POLYESTER FIBERS*

RHODE ISLAND SECTION

RAYMOND B TAYLORSON

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INTRODUCTION

THE printing of the newer synthetic fibers will be of increasing importance as the commercial production of these fibers continues to expand. As there is very little information available to date regarding the printing of the new synthetic fibers, it was believed that a study of this subject would be very constructive and beneficial to the industry. It was decided to confine this study to two representative types: "Orlon" acrylic fiber and "Dacron" polyester fiber. "Orlon" is made from polyacrylonitrile and presumably contains no other monomer than acrylonitrile. "Dacron" is a condensation product made by reacting ethylene glycol with the dimethyl ester of terephthalic acid. These fibers are produced by extruding the resin in liquid form through spinnerets in a manner similar to that used for nylon.

The low moisture regain of these fibers is significant, since it points out the fact that these materials do not absorb water readily and are definitely hydrophobic. This characteristic is a distinct disadvantage in printing and wet processing.

It was considered logical at the outset of this study to utilize the available information dealing with the dyeing of these fibers since printing is localized dyeing. Accordingly, the following types of dyes were investigated:

a) Acetate dyes
b) Acid and Permetallized Acid dyes
c) Vat dyes
d) Leuco esters of vat dyes
e) Direct dyes
f) Mordant dyes
g) Azoic dyes
h) Resin-bonded pigments

This investigation included:

Conventional printing procedures and preparation of the fabric.
Pretreatment of the fabric.
Use of assistants.
Heat treatments for development or fixation of the dye.
Steaming at elevated temperatures.
Pigment application with various binders, pretreatments, and swelling agents.
Aftertreatments.
Surface stripping.

When the various dyes are considered in connection with the different processes, it becomes apparent that the sphere of study is constantly expanding. Under such circumstances it is inevitable that many negative results are obtained. These negative results are recorded hereafter, as such information is valuable in any subsequent investigation. There were, however, several positive results which were investigated further and carried out on a practical scale.

With the increasing demand for better fastness of colored fabrics, the evaluation of all trials was based upon the production of prints possessing satisfactory tinctorial value with acceptable depth of shade and brilliance of color and having good fastness to light, washing and crocking. While under many conditions it was possible to obtain prints, the results were considered to be negative if such prints did not have satisfactory fastness properties as stated.

EXPERIMENTAL LABORATORY PRINT TRIALS ON ORLON AND DACRON FABRICS

PREPARATION OF FABRICS——Early in this study considerable variation was found in the results of print trials because of insufficient or improper preparation of the "Orlon" and "Dacron" fabrics. The oils and sizing compounds used in spinning and weaving must be completely removed to obtain a fabric suitable for printing, and, unless these compounds are removed, poor wash fastness and crock fastness are obtained.

A potentially valuable test was developed by printing the fabrics in question with Aridye Black F2K in water-in-oil-emulsion print paste and subsequently testing for wash, dry and wet crock fastness.

The following methods of preparation were tested:

a) Dacron fabric was scoured with nonionic detergent and ammonia for 15 minutes at 160°F.

b) Orlon fabric was wet out by padding in a cold solvent emulsion (hydrocarbon solvent made into an emulsion with soap and pine oil), allowed to stand 4 to 6 hours, then boiled off in synthetic detergent, soap and soda ash for 15 minutes at 160°F.

* Presented at the Statler Hotel in Boston on Nov 8, 1952 by W George Parks for the Rhode Island Section.

c) "Dacron" fabric (a) and "Orlon" fabric (b) were given additional treatment for 60 minutes at 205°F in 0.2% sodium tetraphosphate, 0.2% alkylarylsulfonate and 0.1% sulfated fatty alcohol.
d) "Dacron" fabric (a) and "Orlon' fabric (b) were given additional treatment for 60 minutes at 205°F in 0.25% oxalic acid, 0.25% sodium chlorite and 0.25% nonionic detergent.
e) "Dacron" fabric (a) and "Orlon" fabric (b) were given combination treatments (c) and (d).
f) "Orlon" fabric (b) was given additional treatment in 1% hydrogen peroxide and 1% acetic acid for 15 minutes at 205°F.
g) "Orlon" fabric (b) was given additional treatment in 0.2% oxalic acid for 15 minutes at 205°F.

"Dacron" fabric was satisfactorily prepared for printing by scouring with a nonionic detergent and ammonia for 15 minutes at 160°F. Further scouring treatments did not seem to improve the color fixation according to prints made with Aridye Black F2K.

"Orlon" fabric is best prepared for printing as follows:

Wet out by padding in a solvent emulsion, allow to stand 4 to 6 hours, then boil off in a synthetic detergent, soap and soda ash for 1 hour and treat at 205°F for 1 hour in a fresh bath containing 0.25% sodium chlorite, 0.25% oxalic acid and 0.25% nonionic detergent.

The Dacron fabric required preheat-setting for 30 seconds at 450°F on a frame set at controlled width to prevent shrinkage in subsequent heat treatments.

This preheat-setting is not recommended for "Orlon", since this fiber yellows at temperatures above 300°F.

CONVENTIONAL PRINTING PROCEDURES——The first print trials were limited to a blue from each class of dyestuff as follows:

		Print Concn %
1) Acid—Alizarine Supra Blue A	Pr 12	1
2) Neutral acid—Sulphon Cyanine 5R Ex	CI 289	2
3) Acetate—Cibacete Sapphire Blue G	Pr 62	3
4) Premetallized acid—Neolan Blue GG	Pr 144	3
5) Vat—Indigo MLB/4B	CI 1184	5
6) Chrome—Eriochrome Azurol B	CI 720	1
7) Direct—Diamine Fast Blue FFB	Pr 71	2
8) Azoic—Rapidogen Blue D	Pr 164	4
9) Leuco ester—Indigo MLB/4B	CI 1184	5
10) Pigment—Aridye Blue FC2G		10

Gum tragacanth made up at 8 oz per gallon was used as a thickener for all preliminary trials (except for pigment blue), and the dyes were made up in parts per hundred according to formulas in general use as follows:

1%	acid blue
49	water
50	gum tragacanth
100	

3%	premetallized blue
36	water
55	gum tragacanth
6	acetate of chrome 32° Tw
100	

2%	direct blue
38	water
60	gum tragacanth
100	

2%	neutral acid blue
48	water
50	gum tragacanth
100	

5%	vat blue
10	water
10	glycerine
5	sulfoxylate
15	potash 47%
55	gum tragacanth
100	

4%	azoic blue
3	caustic soda (25%)
33	hot water
60	gum tragacanth
100	

3%	acetate blue
47	water
50	gum tragacanth
100	

1%	chrome blue
29	water
5	acetic acid 30%
50	gum tragacanth
15	acetate of chrome 32° Tw
100	

5%	leuco ester blue
10	ureaa
5	Cellosolve
19	hot water
50	gum tragacanth
1	ammonia
4	ammonium thiocyanate, 1:1
4	sodium chlorate, 1:3
2	ammonium vanadate, 1:100
100	

Pigment Blue Print Color

Aridye Blue FC2G	10
*Emulsion Print Paste	83
Clear 6818	5
Clear 6000-82	2
	100

**Emulsion Print Paste*

Clear 6000-70	3
Solvent (Amsco 46)	32
Clear 6817	6
Water	59
	100

After being dried on steam-heated cans portions of the prints were developed as follows:

1) Aged 2 x 7 minutes in a laboratory ager (the azoic blue was aged in acetic-acid fumes).
2) Aged 2 x 7 minutes in a plant ager (the azoic blue was acid-aged 4 minutes).
3) Cottage steamed 1¼ hours at 1½ lb pressure.
4) Cottage steamed 1½ hours at 14 lb pressure.
5) Heat-treated 1 and 2 minutes (a) at 300°F for "Orlon"; (b) at 425°F for "Dacron".
6) Heat-treated 5 seconds at 510°F in a Sill Unit.

Several of the above steaming and heat treatments were combined: 1) Plant aging followed by steaming, 2) Plant aging followed by heat treatment, 3) Plant aging followed by both steaming and heat treatment.

All prints were washed in cold water (with the exception of the vat print, which was oxidized 2 minutes in 0.5 oz chrome and 1 oz acetic acid per gallon). All prints were soaped 5 minutes at 160°F in 0.5% synthetic detergent solution.

The following swelling agents and print assistants were tried:

(a) as additions to the print paste
(b) as pretreatment (pad at 160°F and dry) prior to printing.

	(a) %	*(b)* %
1) formic acid and Carbitol acetate	2 3	4 6
2) paraphenylphenol	5	10
3) benzoic acid	1	2
4) zinc chloride	5	10
5) zinc thiocyanate	5	10
6) phenol	5	10
7) urea	20	40
8) monochloroacetic acid	10	20
9) resorcinol	10	20
10) salicylic acid	5	5 & 10
11) ammonium thiocyanate		1
12) Heberlein Process (pretreatment)		
13) monochlorobenzene (dispersed)	5	
14) cuprous-ion pretreatment (copper sulfate, 1:2, 9%; hydroxyl ammonium sulfate (HAS), 1:2, 6%; paraphenylphenol 3%)		
15) cuprous-ion pretreatment substituting sugar for HAS		
16) (a) nylon 8 (dissolved in 35% alcohol — 65% water		20
(b) nylon 8 (water dispersion with addition of 0.25% citric acid catalyst to pH9)		20
17) dimethyl formamide	10 & 20	
18) Ludigol	7.5 & 15	
19) caustic-soda pretreatment: (a) treat 1 minute cold in 30% caustic-soda flakes, rinse, neutralize, rinse, soap at boil, rinse; (b) pad in 6% caustic-soda flakes, steam 15 seconds at 214°F, rinse, neutralize, rinse, soap.		
20) glacial acetic acid		10

These prints were also aged, steamed and heat-treated as previously outlined.

RESULTS —— *Conventional Printing Procedures.* The acid blue (Pr 12), neutral acid blue (CI 289) and direct blue (Pr 71) yielded practically no color fixation on either fiber. The premetallized blue (Pr 144), vat blue (CI 1184), chrome blue (CI 720), azoic blue (Pr 164) and leuco-ester Blue (CI 1184) all indicated some color fixation under normal aging conditions, but in no case was a full true shade obtained on "Orlon" or "Dacron." The acetate blue yielded a true shade on "Dacron" but not on "Orlon."

Pretreatment of Fabrics. The swelling agents as given in column (b) above were applied to "Orlon" and "Dacron" by padding at 160°F and drying. The paraphenylphenol prepare improved the color yield slightly on "Orlon" when printed with acetate blue (Pr 62) and the resorcinol prepare improved the acid blue (Pr 12). "Dacron" prepared with paraphenylphenol showed improved color value of the acid blue (Pr 12), acetate blue (Pr 62) and premetallized acid blue (Pr 144). Resorcinol prepare also improved the yield of the acetate blue on "Dacron," but in practically all cases these pretreatments caused bleeding (flushing) of the color from the printed portion to the white unprinted portion on aging or steaming.

Prints of the pigment blue on Orlon pretreated with 5% salicylic acid were noted to have excellent crock fastness. All other pretreatments of "Orlon" or "Dacron" showed no improvement in crock fastness when printed with pigment blue.

Cuprous-ion pretreatment of "Orlon" resulted in excellent yield and true shade when printed with acid blue (Pr 12). This pretreatment showed no advantage on Dacron.

Pretreatment of "Orlon" or "Dacron" with nylon 8 showed no advantage with any dyes tested, and the hand of the fabric became harsher.

Pretreatment of "Orlon" or "Dacron" by the Heberlein Process showed no improvement with any dyes tested.

Use of Printing Assistants. The swelling agents as given in the last table were added to the print pastes in concentrations as indicated in column (a).

Paraphenylphenol when added to azoic blue print paste produced a shade of normal cast on "Dacron" but yielded only a dull reddish blue on "Orlon."

The addition of monochloroacetic acid and also paraphenylphenol improved the yield of acetate blue (Pr 62) on "Orlon," as did the addition of resorcinol to chrome blue (CI 720) and acid blue (Pr 12).

On "Dacron," the yield of acetate blue (Pr 62) was improved by the addition of several swelling agents, e g, formic acid and Carbitol acetate, paraphenylphenol, benzoic acid and urea. Paraphenylphenol also improved the yield of acid blue (Pr 12) and vat blue (CI 1184), benzoic acid and phenol improved slightly the yield of leuco-ester blue (CI 1184), and resorcinol improved the yield of vat blue (CI 1184) and chrome blue (CI 720). The addition of other swelling agents to other colors showed no improvement.

Heat Treatment. No heat treatment was found effective in improving the color yield of prints on "Orlon," and in some cases the color was destroyed. On "Dacron," however, heat treatment of 1 and 2 minutes at 425°F was found to increase the color yield and brightness of vat blue (CI 1184) and leuco-ester blue (CI 1184). No improvement was noted with prints of acetate blue (Pr 62), chrome blue (CI 720) or azoic blue (Pr 164). Sill Unit treatments for 5 seconds at 510°F were not effective as heat treatments for color fixation.

Steaming. The acetate blue (Pr 62) showed definite improvement in color yield on Orlon when steamed at 1.5 lb. pressure or higher, and the acid blue (Pr 12) showed some color fixation after pressure steaming, whereas there was no fixation after normal aging. On Dacron the acetate blue (Pr 62) showed improved color fixation with pressure steaming, as did the acid blue (Pr 12) and the chrome blue (CI 720). All other dyes tested showed no improvement with prolonged steaming at high temperatures.

Conclusion: The ten blue dyestuffs under the stated test conditions gave little or no color yield when printed on "Orlon" with the exception of the resin-bonded pigment, which gave excellent yield, and the acetate blue, which gave good yield when pressure-steamed. On "Dacron," the resin-bonded pigment, the vat blue and the leuco-ester blue with heat treatment for 1 to 2 minutes at 425°F, and the acetate blue when pressure-steamed gave good color yields.

Since the printing of dispersed acetate dyes and selected acid dyes on acrylic and polyester fibers could not be considered as a new approach, subsequent experimental work on "Orlon" and "Dacron" was limited to

a) resin-bonded pigments
b) vat dyes as pigments
c) vat dyes as micro powders
d) vat dyes as vat acids
e) leuco esters of vat dyes

a) *Resin-bonded pigments.* The encouraging results of the initial work with Aridye Blue FC2G in water-in-oil-emulsion print paste led to a study of other types of print pastes and phthalocyanine blues and also to a determination of the effect of high curing temperatures on crock fastness.

The test and the results obtained on Dacron were as follows:

1) Aridye Blue FC2G in water-in-oil emulsion was printed and cured at 425°F for two minutes.

Result—Wet crock resistance decreased, otherwise no change in performance. Considered inferior to this blue cured at 280°F for two minutes, which was taken as the standard for comparison.

2) Phthalocyanine blue in an oil-in-water emulsion was printed and cured at 280°F.

Result—Color value on a pound-for-pound basis was below the water-in-oil emulsion. Wet crock resistance very poor. Considered inferior to standard.

3) Same as #2 except that fabric was cured at 425°F for two minutes.

Result—Shade became somewhat flatter and redder. Wet crock resistance very poor. Considered inferior to standard.

4) Phthalocyanine blue in a vinyl print paste was printed and cured at 280°F for two minutes.

Result—Wet crock resistance was slightly inferior to standard. Otherwise this print was good.

5) Same as #4 except fabric was cured at 425°F for two minutes.

Result—Shade became somewhat flatter. Wet crock resistance was slightly inferior to standard. No apparent advantage in higher curing temperature.

6) Dry phthalocyanine-blue pigment was printed in a Methocel print paste and cured at 425°F for two minutes.

Result—Poor appearance, no wash fastness and very poor crock resistance. Far inferior to standard.

7) Same as #6 except that print paste was water-in-oil emulsion (Aridye).

Result—Very poor crock resistance. Inferior to standard.

The tests and the results obtained on "Orlon" were as follows:

1) The standard Aridye Blue FC2G was printed and cured at 425°F for two minutes.

Result—Shade became quite flat. Crock resistance decreased. Considered inferior to standard.

2) Phthalocyanine blue in an oil-in-water emulsion was printed and cured at 280°F.

Result—Color value on a pound-for-pound basis was below the standard. Wash fastness and crock resistance were very poor. Very inferior to standard.

3) Same as #2 except that fabric was cured at 425°F for two minutes.

Result—Shade became flatter. Wash fastness and crock resistance were very poor. Very inferior to standard.

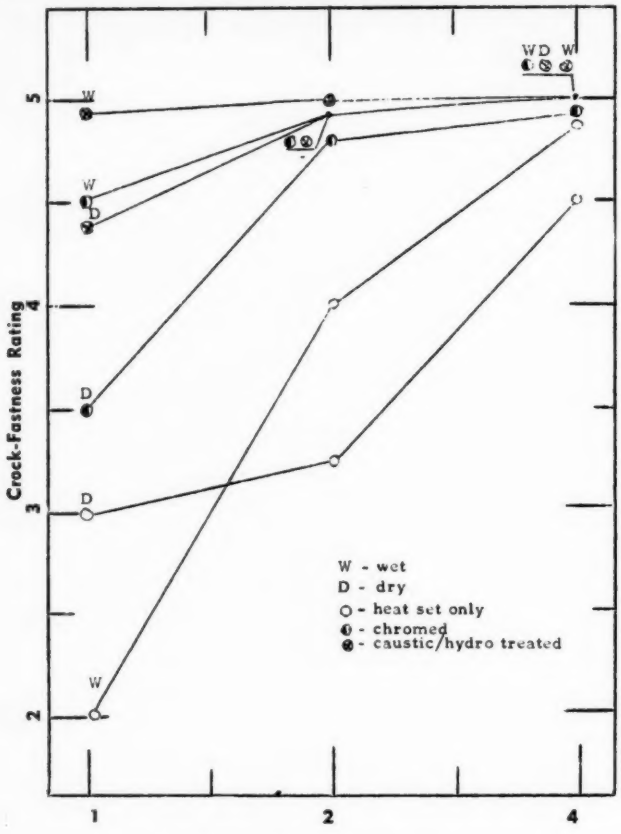

Figure 1
Fastness to Crocking, 1% Leuco Ester of Vat Jade Green (C I 1101)

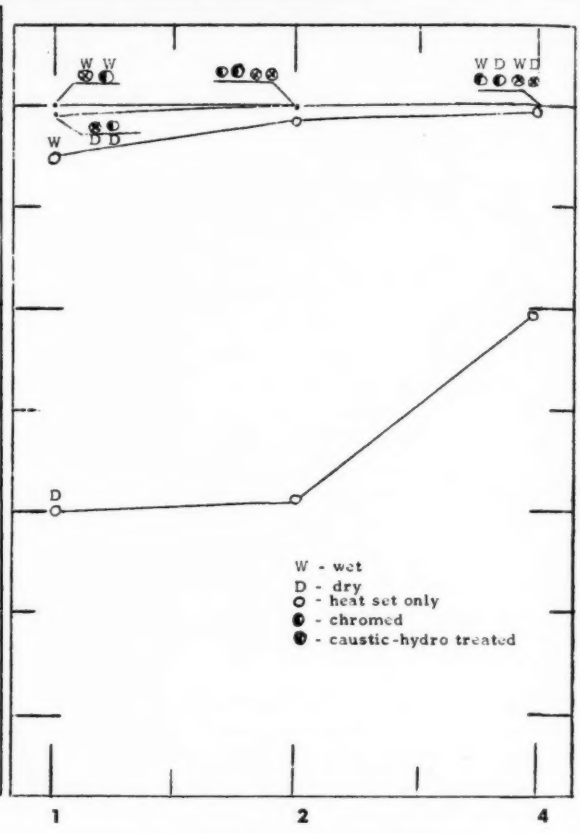

Figure 2
Fastness to Crocking, 1% Leuco Ester of Vat Pink (Pr 109)

4) Phthalocyanine blue in a vinyl print paste was printed and cured at 280°F for two minutes.

Result—Very mottled print. Stiff hand, not broken down during wash test. Crock resistance excellent. Print considered inferior to standard.

5) Same as #4 except that fabric was cured at 425°F for two minutes.

Result—Shade became flatter. Crock resistance decreased. Considered inferior to standard.

6) Dry phthalocyanine blue pigment was printed in a Methocel print paste and cured at 425°F for two minutes.

Result—Poor appearance, no wash fastness and very poor crock resistance. Far inferior to standard.

7) Same as #6 except that print paste was water-in-oil emulsion (Aridye.)

Result—Very poor crock resistance, inferior to standard.

Summary —— 1) High temperature curing (425°F for two minutes) shows no advantage over curing at 280°F for two minutes. 2) Oil-in-water system, vinyl ink system, phthalocyanine blue powder dispersed in Methocel, and phthalocyanine blue powder dispersed in water-in-oil system all proved to be inferior in shade and crock fastness to phthalocyanine blue paste of Aridye type dispersed in water-in-oil system.

After reviewing the results obtained with high-temperature curing, water-in-oil emulsions, oil-in-water emulsions and aqueous-type print pastes with phthalocyanine blue in various forms, we decided that the potential value of a pretreatment with salicylic acid followed by printing with a water-in-oil emulsion merited further investigation.

Accordingly, the same "Dacron" fabric as previously used and a new "Orlon" fabric (twill) were pretreated with 5% salicylic acid and printed with the following pigment dyes: two azoic reds, a vat violet (thio indigoid), carbon black, a phthalocyanine blue and a mineral yellow.

It was found on "Dacron" that the pretreatment improved the wet crock resistance of the vat violet and phthalocyanine blue notably. However, the other colors showed a slight drop in wet crock resistance.

On "Orlon" the pretreatment improved the dry and wet crock resistance of the vat violet. The mineral yellow showed a slight drop in wet crock resistance. The other four colors were not affected.

b) *Vat dyes as pigments.* Two additional thickeners were used for printing vat pigments:

1) Methocel paste
3 g Methocel 4000 cps
128 g water
131 g

2) Ethyl cellulose emulsion
5 g Aridye Clear 6214
20 g mineral spirits
75 g water
100 g

Printing pastes were prepared by dispersing 10% of a commercial vat-pigment paste in the above thickeners. Colors used were

Pink FFP	Pr 109
Jade Green	CI 1101
Blue BF	CI 1113
Violet 2RA	CI 1104
Brown BR	Pr 118
Blue 2BDG	CI 1184
Flavone GC	Pr 9
Black N	

After printing, the fabric was treated as follows:

1) Heat-set two minutes at 450°F.
2) Heat set two minutes at 450°F, pad with 10% flake caustic and 10% sodium hydrosulfite. Steam 10 seconds. Oxidize in water and soap five minutes at 160°F in 0.5% detergent.

Results. On "Dacron" the vat dyes as pigments, which were rather dull when printed, became more brilliant after heat treatment. A treatment with caustic soda and hydrosulfite followed by steaming improved the fixation of the colors that had been heat-treated. Those colors that had not been heat-treated showed very little or poor development of color with the caustic and hydro treatment.

On "Dacron," Methocel paste produced prints of better dry crockfastness than those with the ethylcellulose emulsion, but, because of the fuller prints obtained with the emulsion, further trials were made with this thickener.

Very little or poor development of color was obtained on Orlon; therefore, no further trials were made.

c) *Vat dyes as micro powders.* Print tests were also made with micro powders on spun and filament "Dacron."

Printing pastes were prepared by dispersing the micro powders, which are of extremely small particle size, in the prepared ethylcellulose emulsion except with Brilliant Green 2G micro powder, where it was necessary to disperse the dye first in water.

1 g Brilliant Green 2G
75 g water
mix and then add to
5 g Aridye Clear 6214 and
20 g mineral spirits

101 g

Yellow GC and Red 2B micro powders were prepared with

1 g color
5 g Aridye Clear 6214
20 g mineral spirits
75 g water

101 g

Blue GF micro powder was prepared with

2 g color
5 g Aridye Clear 6214
20 g mineral spirits
75 g water

102 g

After printing, the fabrics were treated as follows:

1) Heat-set two minutes at 450°F.
2) Heat-set two minutes at 450°F., pad with 10% flake caustic and 10% sodium hydrosulfite. Steam 10 seconds. Oxidize in water and soap 5 minutes at 160°F in 0.5% detergent.

Results. Satisfactory prints were obtained with micro powders on both the spun and filament Dacron. All micro powders tested appeared brilliant except the Red 2B micro powder which was dull and orange. Crock fastness with blue and yellow micro powders was considerably better than with commercial vat pigment pastes. The green and red micro powders showed no improvement in crocking fastness over the corresponding vat pigment pastes. The green developed a true green shade and the blue also appeared to be the true shade.

d) *Vat dyes as Vat Acids.* Vat acids were prepared from commercial vat pastes and also from special vat pastes which did not contain any dispersing agent. The vat acids were prepared as follows:

3.2 g color
1.0 g caustic flakes
1.5 g sodium hydrosulfite
0.1 g Blancol Conc Pdr
44.2 g water

50

1) Reduce at 140°F.
2) Add 2.5 ml acetic acid, 80%
3) Cool and add 50 ml cold water
4) Prepare emulsion by mixing:
5 g Aridye Clear 6214
20 g mineral spirits
75 g vat-acid solution

The colors used were the following:

Pink FFP	Pr 109*
Jade Green	CI 1101*
Violet 2RA	CI 1104
Flavone GC	Pr 9
Blue BF	CI 1113
Black N	

The prints were treated as follows:

1) Heat-set two minutes at 450°F.
2) Heat-set two minutes at 450°F, pad with 10% caustic flakes and 10% hydrosulfite. Steam 10 seconds. Oxidize and soap five minutes at 160°F in 0.5% detergent.

Results. Pink FF (Pr 109), Violet 2RA (CI 1104), and Jade Green (CI 1101) developed very bright shades on heat treatment. Flavone GC (Pr 9), Blue BF (CI 1113) and Black N developed somewhat less than the first three and were weakened considerably by the caustic treatment. After the caustic and hydrosulfite treatment, the vat dyes applied as vat acids appeared to have better crock fastness than the same vat dyes applied as pigments.

*Also in special form containing no dispersing agent or additives.

e) *Printing Soluble Vats (leuco esters of vat dyes) on Acrylic and Polyester fibers.*

A number of techniques for leuco esters were suggested, but the one which appeared to offer the greatest potential was the heat-setting method. The theory upon which the following work has been based is that a "solid solution" could be obtained at or near the softening point of the fibers, and that at such elevated temperatures the leuco esters possibly would oxidize without chemical assistance.

It soon became apparent that four important aspects would require investigation:

1) A suitable thickener.
2) Proper solvent.
3) Optimum heat-setting times and temperatures.
4) Fastness properties.

In general, two factors in the composition of thickener solutions are important:

1) The type of solids
2) The concentration of solids

The thickeners used in order of decreasing concentration were as follows:

1) 3lb/gal Brown Gum BA (Stein Hall & Co); cooked one hour at 195°F
2) 14 oz/gal Flotex (National Starch Prod); heated to 190°F and cooked 30 minutes.
3) 8 oz/gal gum tragacanth; soaked overnight in cold water, then cooked at 180-190°F until clear.
4) 3 oz/gal Keltex (Kelco Co); dispersed in cold water with high-speed mixer until swollen.
5) 3 oz/gal Methocel 4000 cps (Dow Chemical Co); dispersed in cold water and stirred slowly until in solution.
6) 3 oz/gal Colloresine MV (General Dyestuff Corp); dispersed in cold water and stirred until smooth.
7) 7.75 oz Aridye Clear 6214 (Interchemical Corp); 29.0 oz Amsco mineral spirits; 96.25 oz cold water; bulk to one gallon; mixed at high speed.

For purposes of testing the value of the above thickeners, leuco ester Pink IR (Pr 109) at 1% was used, dissolved in

2% Cellosolve
2% urea
10% water at 150°F
86% thickener

Formula No. 7 produced an outside oil-phase emulsion having nonvolatile solids

TABLE I

Thickener	Brown Gum BA	Flotex	Gum Tragacanth	Keltex	Methocel	Collorésine	Clear 6214
Color Value	very poor	poor	fair	exc	good	good	exc
Shade	very poor	fair	fair	good	good	fair	exc
Dry Crock* Rating	5.0	5.0	4.9	4.5	5.0	5.0	4.0
Wet Crock Rating	5.0	4.9	4.9	5.0	5.0	5.0	5.0

* (Crock rating 5.0 indicates maximum crock fastness, i e, no color transference).

of approximately 0.6%.

The solvent and resin were dispersed together in a high-speed mixer; then cold water was added slowly with mixing. The viscosity can be adjusted by adding water to thicken or by adding solvent to thin the print paste.

Experimental samples were printed, dried, heat-set at 450°F for two minutes, and then one portion of these samples was washed lightly. Both the washed and unwashed portions were subjected to crocking at 20 cycles on a standard AATCC Crockmeter with 80/80 cotton. In Table I are the results of these tests, using the AATCC Color Transference Chart (*1*) as a standard on the crock portions.

Table I indicates that an outside-oil-phase emulsion with very low solids shows the best all-round properties. The apparent advantages of Methocel were discounted by further work, which disclosed poor compatibility with a number of leuco esters of vat dyes.

SOLVENT SELECTION——An examination of readily available solvents, i e, cellosolve and/or urea, was made with results exhibited in Table II when 1% of the leuco ester of Pink IR (Pr 109) in Aridye Clear 6214 was used as the control.

Based on comparative color value and washfastness, Formula 2 was outstanding and was established as the basic formula for all subsequent work. In order to reduce the possible effects of varying viscosities, the aqueous phase of the Aridye Clear 6214 was adjusted to maintain similar body.

Optimum Heat-Setting Times and Temperatures. The temperature selected as optimum was 450°F, which is apporximately the softening point of Dacron according to already published reports (*2*) and which, fortunately, was within the range of heating apparatus available for the work. Actually, the work was confined to a study of the most practical time of setting at 450°F on filament Dacron. Tests were conducted for 1, 2 and 4 minutes at 450°F.

TABLE II

Formula No.	1 %	2 %	3 %	4 %	5 %	6 %
Color	1	1	1	1	1	1
Urea	4		2	8	16	
Cellosolve		4	2	8	16	8
Hot water	10	10	10	10	10	10
Thickener No. 7	85	85	85	73	57	81

It appears that a judgment of color value in relation to time of heat setting is difficult to assess accurately. In general, the tendency seems to favor the longer periods of time for complete development and fixation of color. However, there does seem to be evidence that the greatest percentage of color development takes place within the first minute of heat setting at 450°F and then proceeds to "full" development at a reduced rate. The inconsistencies of color development and fixation may be caused by variations in printing conditions and heat setting. The significant feature of this experiment is the relation of time in heat setting to crock fastness. The following graphs use crock fastness as a measure of color fixation. The graphs also show that a decided improvement in crock fastness is obtained when the prints are treated with

10% sodium hydroxide and
10% sodium hydrosulfite, both owf,

and steamed in a continuous dye steamer for 10 seconds followed by conventional oxidation in sodium bichromate and sulfuric acid.

For purposes of setting up a graph showing crock fastness, we have used the standard AATCC Chart for Measuring Transference of Color (*1*) and have plotted the results against time of heat setting for the three methods of fixation, i e,

1) Heat set only
2) Heat set and chrome aftertreated
3) Heat set and caustic/hydro aftertreated.

SUMMARY——On Dacron, leuco esters of vat dyes produced prints of excellent yield and fixation when heat-set and aftertreated by the method outlined immediately above. Very little merit was observed for leuco esters of vat dyes on Orlon, and no appreciable advantage was noted on either fiber pretreated by the cuprousion method.

In conclusion, it may be stated that the question arises as to the state of the leuco ester of vat dyes on "Dacron." The term "solid solution" has been used in an effort to describe the dye fixation. Further investigation of the physical chemistry involved (possibly cross-sectional photomicrographs) would indicate exactly what happens.

PRACTICAL PLANT TRIALS

PREPARATION OF "ORLON"—— Fabric was padded through a hydrocarbon solvent and soap emulsion at room temperature and let stand 4 to 6 hours, then boiled off for 6 ends on a jig with synthetic detergent, soap and soda ash, rinsed, bleached for 6 ends on a jig at the boil with 0.25% oxalic acid, 0.25% sodium chlorite and 0.25% nonionic detergent, rinsed and dried on frames. Preheat-setting of "Orlon" prior to printing was not necessary, since subsequent heat treatments at temperatures below 300°F did not change the dimensional stability of this fabric.

PREPARATION OF "DACRON"—— Fabric was scoured 6 ends on a jig at 160°F with a nonionic detergent and ammonia, rinsed and dried.

The fabric was then given a preheat treatment of 30 seconds at 450°F on a tenter frame set at controlled width to prevent shrinkage during subsequent heat treatments.

Printing Trials:

"Orlon" and "Dacron" were printed in a four-color-stripe pattern with the following types of dyes:

A) Aridye pigments
B) Leuco esters of vat dyes
C) Vat dyes as pigments
D) Vat dyes as vat acids

Results are presented in Table III.

Inadvertently the quantity of Blancol used in the vat-acid formulation was incorrect and should have been 10 oz, or 2 oz per gal. Obviously, therefore, the vat-acid dispersions were incomplete, and a considerable amount of dye was strained out. Actually, the equivalent of 40 oz of Violet 4R Paste and 13 oz of Pink FF Paste was filtered out; this resulted in much weaker prints than anticipated. It is recognized that, in the case of Violet 4R, the amount of dyestuff employed actually exceeded the limit of solubility of the sodium leuco compound of this particular dye.

The colors were printed without a crush roller in the following sequence:

Aridye pigments	*Vat pigments, vat acids and leuco esters of vat dyes*
1) yellow	1) yellow
2) red	2) pink
3) blue	3) violet
4) black	4) green

These prints were then heat-treated in a Proctor & Schwartz hot-air curing unit as follows:

1) Aridye pigment prints on "Orlon" and "Dacron"—3 minutes at 300°F.

TABLE III
FORMULATIONS OF PRINT PASTES

A—ARIDYE PIGMENTS*

	%	
Aridye Yellow FY2G	20.0	12.50 lb
Emulsion Print Paste #1	72.2	6.00 gal
Aridye Clear 6818	5.0	3.10 lb
Aridye Clear 6000-82	2.0	1.25 lb
Lubricant 6953	0.8	8.00 oz
	100.0	approx 8 gal
Aridye Red LDB	10.0	6.25 lb
Emulsion Print Paste #1	82.2	6.75 gal
Aridye Clear 6818	5.0	3.10 lb
Aridye Clear 6000-82	2.0	1.25 lb
Lubricant 6953	0.8	8.00 oz
	100.0	approx 8 gal
Aridye Blue FC2G	10.0	6.25 lb
Emulsion Print Paste #1	82.2	6.75 gal
Aridye Clear 6818	5.0	3.10 lb
Aridye Clear 6000-82	2.0	1.25 lb
Lubricant 6953	0.8	8.00 oz
	100.0	approx 8 gal
Aridye Black F2K	25.0	15.60 lb
Emulsion Print Paste #2	65.6	5.60 gal
Aridye Clear 6818	5.0	3.10 lb
Aridye Clear 6000-82	2.0	1.25 lb
Pine oil	0.8	0.50 lb
Lubricant 6953	1.6	1.00 lb
	100.0	approx 8 gal

Emulsion Print Paste #1

	%	
Clear 6000-70	3	77 oz
Amsco 46	32	6 gal 51 oz
Clear 6817	6	1 gal 26 oz
water	59	11 gal 102 oz
	100	20 gallons

Emulsion Print Paste #2

Clear 6000-70	3	77 oz
Amsco 46	40	8 gal oz
Clear 6817	6	1 gal 26 oz
water	51	10 gal 25 oz
	100	20 gallons

* Aridye pigments, with the exception of the black, were of the extra-low-crock series.

B—LEUCO ESTERS OF VAT DYES

	%	
Indigosol Yellow GCN (Pr 9)	3.0	30.0 oz
Cellosolve	5.0	50.0 oz
hot water	13.0	1.0 gal
cold water	51.8	4.0 gal
Add to		
Aridye Clear 6214	7.2	4.5 lb
Amsco 46	20.0	12.5 gal
with high-speed mixing	100.0	approx 8 gal
Algosol Pink IR Fine CF (Pr 109)	2.0	20.0 oz
Cellosolve	5.0	50.0 oz
hot water	13.0	1.0 gal
cold water	52.8	4.0 gal
Add to		
Aridye Clear 6214	7.2	4.5 lb
Amsco 46	20.0	12.5 lb
with high-speed mixing	100.0	approx 8 gal
Indigosol Brilliant Violet I4R (CI 1104)	2.0	20.0 oz
Cellosolve	5.0	50.0 oz
hot water	13.0	1.0 gal
cold water	52.8	4.0 gal
Add to		
Aridye Clear 6214	7.2	4.5 lb
Amsco 46	20.0	12.5 lb
with high-speed mixing	100.0	approx 8 gal
Algosol Green IB CF (CI 1101)	2.0	20.0 oz
Cellosolve	5.0	50.0 oz
hot water	13.0	1.0 gal
cold water	52.8	4.0 gal
Add to		
Aridye Clear 6214	7.2	4.5 lb
Amsco 46	20.0	12.5 lb
with high-speed mixing	100.0	approx 8 gal

C—VAT PIGMENTS

	%	
Carbanthrene Prtg Flavine GCL Paste (Pr 9)	15.0	9.50 lb
water	57.0	4.50 gal
Add to		
Aridye Clear 6214	10.0	6.25 lb
Amsco 46	18.0	11.25 lb
with high-speed mixing	100.0	approx 8 gal
Ciba Pink FF Paste (Pr 109)	10.0	6.25 lb
water	62.0	5.00 gal
Add to		
Aridye Clear 6214	10.0	6.25 lb
Amsco 46	18.0	11.25 lb
with high-speed mixing	100.0	approx 8 gal
Ponsol Jade Green Supra Double Paste (CI 1101)	10.0	6.25 lb
water	62.0	5.00 gal
Add to		
Aridye Clear 6214	10.0	6.25 lb
Amsco 46	18.0	11.25 lb
with high-speed mixing	100.0	approx 8 gal
Carbanthrene Brilliant Violet 4R Paste (CI 1104)	10.0	6.25 lb
water	62.0	5.00 gal
Add to		
Aridye Clear 6214	10.0	6.25 lb
Amsco 46	18.0	11.25 lb
with high-speed mixing	100.0	approx 8 gal

D—VAT ACIDS

	%	
Carbanthrene Prtg Flavine GCL Paste (Pr 9)	7.6	4.75 lb
caustic soda, 50%	3.6	2.25 lb
sodium hydrosulfite	2.4	1.50 lb
Blancol	0.2	2.00 oz
hot water	22.2	1.62 gal
	36.0	2.50 gal
Reduce at 130°F.		
Add		
acetic acid, 56%	6.4	4.00 lb
in cold water	28.8	2.25 gal
Strain and add to		
Aridye Clear 6214	7.2	4.50 lb
Amsco 46	21.6	13.00 lb
with high-speed mixing	100.0	approx 8 gal
	%	
Ciba Pink FF Paste (Pr 109)	2.4	1.50 lb
caustic soda, 50%	3.6	2.25 lb
sodium hydrosulfite	2.4	1.50 lb
Blancol	0.2	2.00 oz
hot water	27.4	2.00 gal
	36.0	2.50 gal
Reduce at 180°F.		
Add		
acetic acid, 56%	1.60	1.00 lb
in cold water	37.2	2.75 gal
Strain and add to		
Aridye Clear 6214	7.2	4.50 lb
Amsco 46	18.0	11.50 lb
with high-speed mixing	100.0	approx 8 gal
Carbanthrene Brilliant Violet 4R Paste (CI 1104)	5.2	3.25 lb
caustic soda, 50%	3.6	2.25 lb
Sodium hydrosulfite	2.4	1.50 lb
Blancol	0.2	2.00 oz
hot water	24.6	1.75 gal
	36.0	2.50 gal
Reduce at 130°F.		
Add		
acetic acid, 56%	6.4	4.00 lb
in cold water	32.4	2.25 gal
Strain and add to		
Aridye Clear 6214	7.2	4.50 lb
Amsco 46	18.0	1.25 lb
with high-speed mixing	100.0	approx 8 gal
Ponsol Jade Green Double Paste (CI 1101)	5.2	3.25 lb
caustic soda, 50%	3.6	2.25 lb
sodium hydrosulfite	2.4	1.50 lb
Blancol	0.2	2.00 oz
hot water	24.6	1.75 gal
	36.0	2.50 gal
Reduce at 130°F.		
Add		
acetic acid, 56%	6.4	4.00 lb
in cold water	32.4	2.25 gal
Strain and add to		
Aridye Clear 6214	7.2	4.50 lb
Amsco 46	18.0	11.25 lb
with high-speed mixing	100.0	approx 8 gal

2) Vat pigments, vat acids and leuco esters of vat dyes on "Orlon"—3 minutes at 300°F.

3) Vat pigments, vat acids and leuco esters of vat dyes on "Dacron"—3 minutes at 430°F.

Subsequent processing was as follows:

1) Aridye pigment prints on "Orlon" and "Dacron" were washed 5 minutes at 160°F in 0.5% synthetic detergent solution.

2) Prints of vat pigments, vat acids and the leuco esters of vat dyes on "Orlon" and "Dacron" were run on a continuous open soaper through a solution containing 0.5 oz sodium bichromate and 0.25 oz sulfuric acid, 66° Bé, per gallon at 160°F, rinsed and washed 5 minutes at 160°F in 0.5% synthetic detergent, rinsed, can-dried and dry-framed.

3) Prints of vat pigments, vat acids and the leuco esters of vat dyes on "Orlon" and "Dacron" were run through a pad-steam unit at 75 ypm. The pad contained a cold solution of 10 oz caustic soda, 104° Tw, and 6 oz sodium hydrosulfite per gallon. From the padder, the cloth was passed directly into a continuous steamer, steamed 15 seconds at 214°F, and was passed out through a water seal directly into a Williams unit containing a cold solution of 5 oz sodium bicarbonate per gallon. Prints were then oxidized and washed as described directly above.

Other portions of the prepared "Orlon" and "Dacron" fabrics were screen-printed with the same printing pastes previously defined, and these prints were also heat-treated, oxidized and washed in the manner described for the corresponding roller prints.

OBSERVATIONS——The Aridye pigment formulations contained resin binders in both the inner and outer phases of the emulsion in order to obtain maximum crock fastness.

The vat-pigment, vat-acid and leuco-ester-of-vat-dye print formulations contained an ethylcellulose-emulsion thickener with very low solids content (0.6% solids), inasmuch as previous laboratory results indicated that the lower the amount of solids, the better the color value.

Vat-pigment, vat-acid and leuco-ester prints on "Orlon," and the vat-pigment and vat-acid prints on "Dacron" bled excessively when given the pad-steam treatment in caustic soda and sodium hydrosulfite. The leuco-ester prints on "Dacron" bled very little when given this caustic-and-hydro pad-steam treatment and the shades were brightened.

Prints of Vat Pink FF as pigment, vat acid and leuco ester on "Dacron" sublimed (staining white grounds) when heat-treated 3 minutes at 470-480°F, but no sublimation was noticed at a temperature

of 430°F.

The print pastes made with the ethylcellulose-emulsion low-solids thickener were characterized by smooth printing, good consistency and excellent running properties.

On both "Orlon" and "Dacron," a slight tackiness was noted with the Aridye Black F2K print (25% concentration), which was improved but not eliminated by additional heat treatment, viz 5 minutes at 300°F.

With reference to the bleeding of prints of vat pigments, vat acids and leuco esters of vat dyes in the caustic-and-hydro pad-steam treatment, it is suggested that one or more of the following treatments might considerably reduce or even eliminate the bleeding or migration of the dye:

1) Run directly from the steamer into a strong oxidizing bath.
2) Add electrolytes to the chemical reduction pad.
3) Substitute, in whole or in part, soda ash or potash for caustic soda in the chemical-reduction pad.
4) Shorten time in the steamer to approximately 5 seconds.
5) Pad through a cold chemic bath which contains 0.3% available chlorine, and immediately dry to clear the grounds of any staining.

In screen printing, the emulsion pastes passed through the screens rapidly and required only one-half stroke with a keen edged blade to produce sharp prints of excellent coverage.

RESULTS——1) Aridye pigment prints on both "Orlon" and "Dacron" showed excellent yield with excellent fastness to light and washing. The dry crocking fastness was excellent on "Orlon" and very good on "Dacron." The wet crocking fastness was very good on "Orlon" and fair on "Dacron" (see following table).

2) Vat-pigment prints on "Orlon" and "Dacron" showed excellent yield and fastness to light and washing but only fair to good fastness to dry and wet crocking (see following table).

3) Vat-acid prints on "Orlon" and "Dacron" showed fair to good yield with excellent fastness to light, very good fastness to washing but poor to fair fastness to dry and wet crocking (see following table).

4) The leuco-ester prints showed poor yield on "Orlon," but on Dacron the yield was excellent. The fastness to light and washing on "Dacron" was excellent, but fastness to dry and wet crocking was only good on prints which were heat-set, oxidized and washed. Prints that were given caustic and hydro pad-steam treatment to remove loose surface color showed excellent yield on "Dacron" with very little loss in color value by this treatment, and these prints showed excellent fastness to light and washing and very good fastness to dry and wet crocking (see Table IV).

It should be noted again that only the leuco-ester prints on "Dacron" were improved in rubbing fastness by the caustic and hydro pad-steam treatment, that is, were improved in dye fixation. The vat-pigment and vat-acid prints bled excessively when given the caustic and hydro pad-steam treatment.

TABLE IV
FASTNESS PROPERTIES

40-Hour Fade-Ometer Exposure		Dry Rubbing (Crocking)		Wet Rubbing (Crocking)		AATCC Wash Test #3		
A	B	A	B	A	B	A	B	
								ARIDYE PIGMENTS
5	5	5	4	4	2	5	5	Aridye Yellow FY2G
5	5	5	4	4	2	5	5	Aridye Red LDB
5	5	5	4	4	2	5	5	Aridye Blue FC2G
5	5	5	4	4	2	5	5	Aridye Black F2K
								VAT PIGMENTS
5	5	3	2	2	2	5	5	Carbanthrene Prtg Flavine GCL Pst (Pr 9)
5	5	3	2	2	2	5	5	Ciba Pink FF Paste (Pr 109)
5	5	3	2	2	2	5	5	Carbanthrene Brill Violet 4R Pst (CI 1104)
5	5	3	2	2	2	5	5	Ponsol Jade Green Supra (CI 1101)
5	5	2	1	2	1	5	4	Ponsol Jade Green Supra (CI 1101)
								VAT ACIDS
5	5	2	1	2	1	5	4	Carbanthrene Prtg Flavine GCL Pst (Pr 9)
5	5	2	1	2	1	5	4	Ciba Pink FF Paste (Pr 109)
5	5	2	1	2	1	5	4	Carbanthrene Brill Violet 4R Pst (CI 1104)
								LEUCO ESTERS OF VAT DYES HEAT-TREATED, OXIDIZED IN CHROME AND SULFURIC ACID AND WASHED
–	5	–	3	–	3	–	5	Indigosol Yellow GCN (Pr 9)
–	5	–	3	–	3	–	5	Algosol Pink IR Fine CF (Pr 109)
–	5	–	3	–	3	–	5	Indigosol Brill Violet 14R (CI 1104)
–	5	–	3	–	3	–	5	Algosol Green IB-CF (CI 1101)
								LEUCO ESTERS OF VAT DYES, HEAT-TREATED, CAUSTIC AND HYDRO PAD-STEAM TREATMENT FOLLOWED BY WASH
–	5	–	5	–	4	–	5	Indigosol Yellow GCN (Pr 9)
–	5	–	5	–	4	–	5	Algosol Pink IR Fine CF (Pr 109)
–	5	–	5	–	4	–	5	Indigosol Brill Violet 14R (CI 1104)
–	5	–	5	–	4	–	5	Algosol Green IB-CF (CI 1101)

Class For All Tests

A—"Orlon" 5—excellent 2—fair
B—"Dacron" 4—very good 1—poor
3—good

Editor's Note: Ratings for washing are not according to 1952 AATCC Standard Methods, which reserves "5" for Wash Test #4.

SUMMARY

"ORLON" ACRYLIC FIBER——Laboratory trials showed that this fabric must be given a thorough preparation to remove all sizing materials and waxes prior to printing. Laboratory trials further showed that "Orlon" can be printed with

1) Selected acid dyes with subsequent pressure steaming (this was not considered a new approach).
2) Acetate dyes with subsequent pressure steaming (this was not considered a new approach).
3) Aridye pigment colors of extra-low-crock series.
4) Vat pigments in ethylcellulose emulsion.
5) Vat acids in ethylcellulose emulsion.

Practical plant trials of roller and screen prints confirmed that "Orlon" acrylic fibers can be printed with Aridye pigments, vat dyes as pigments and vat dyes as vat acids to produce prints with excellent fastness to light and washing and fair to very good fastness to dry and wet crocking.

"DACRON" POLYESTER FIBER——Laboratory trials showed that this fabric was easily prepared for printing by scouring in synthetic detergent and ammonia, but the fabric had to be preheat-set at

450°F on a frame at controlled width to prevent shrinkage during subsequent heat treatments. Laboratory trials further showed that "Dacron" can be printed with

1) Acetate dyes with subsequent pressure steaming (this was not considered a new approach).
2) Aridye pigment colors of extra-low-crock series.
3) Vat dyes as pigments in ethylcellulose emulsion.
4) Vat dyes as vat acids In ethylcellulose emulsion.
5) Leuco esters of vat dyes in ethylcellulose emulsion.

Practical plant trials of roller and screen prints confirmed that "Dacron" polyester fibers can be printed with Aridye pigments, vat pigments, vat acids and leuco esters of vat dyes with subsequent heat treatment of 3 minutes at 425°F, and such prints showed excellent yield, excellent fastness to light and washing, and good to very good fastness to dry and wet crocking.

With leuco esters of vat dyes, the fixation was obtained by a simple heat treatment without chemical assistants. The degree of fixation was such that a stripping treatment with caustic soda and hydrosulfite in a pad-steam unit followed by washing removed only loose surface color without material loss of color yield and produced prints of excellent fastness to light and washing. The fastness to crocking was definitely improved.

This investigation has produced the following original developments in the printing of acrylic and polyester fibers:

1) A low-solids emulsion carrier can be used for printing vat pigments, vat acids and leuco esters of vat dyes on "Orlon" and "Dacron."
2) High temperature alone can be used as a developing medium for fixation of vat pigments, vat acids and particularly leuco esters on "Orlon" and "Dacron" without chemical assistants.
3) Comparable yields of vat pigments, vat acids and leuco esters of vat dyes on "Orlon" and "Dacron" are presented.
4) Plant trials indicated the practicability of printing Aridye pigments in the same pattern with vat pigments, vat acids or leuco esters of vat dyes, since the print-paste emulsions are all of similar nature.
5) Commercially satisfactory prints have been produced as follows:
   On "Orlon" acrylic fiber
   A) With special formulations of Aridye pigments.
   B) With vat pigments in ethylcellulose emulsion.
   C) With vat acids in ethylcellulose emulsion.
   On "Dacron" polyester fiber
   A) With special formulation of Aridye pigments
   B) With vat dyes as pigments in ethylcellulose emulsion
   C) With vat dyes as vat acids in ethylcellulose emulsion
   D) With leuco esters of vat dyes in ethylcellulose emulsion

TRADE MARKS

The following trade-marked names have been used in the foregoing text:

Algosol	General Dyestuff Corp
Aridye	Interchemical Corp
Carbanthrene	National Aniline Div Allied Chemical & Dye Corp
Colloresine	General Dyestuff Corp
Dacron	E I du Pont de Nemours & Co, Inc
Keltex	Kelco Co
Methocel	Dow Chemical Co
Orlon	E I Du Pont de Nemours & Co, Inc
Ponsol	E I du Pont de Nemours & Co, Inc

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Carbic Color & Chemical Co, Inc
Ciba Co, Inc
Cohn Hall Marx Co
Cranston Print Works Co
Defiance Bleachery
E I du Pont de Nemours & Co, Inc
General Dyestuff Corp
Glenlyon Print Works
Greenville Finishing Co, Inc
Interchemical Corp, Textile Colors Div
Kenyon Piece Dye Works, Inc
National Aniline Div, Allied Chemical & Dye Corp
Polymer Industries, Inc
Rainbow Valley Dye Works, Inc
Riveredge Printers, Inc
Sayles Finishing Plants, Inc
United States Finishing Co
University of Rhode Island

REFERENCES

(1) Am Dyestuff Reptr 34, 500 (1945).
(2) Calco Technical Bull 826, p 9.

PRELIMINARY INVITATION TO CONTRIBUTE TECHNICAL PAPERS AT 1953 CONVENTION

PREPARATIONS for the technical program at the 1953 National Convention, to be held in Chicago, Illinois, September 17-19, are now underway. Persons desiring to present a paper should proceed according to the following established instructions and regulations:

(1) Notify Elliott Morrill, Convention Technical Program Chairman, The Best Foods, Inc, 1437 West Morris Street, Indianapolis 6, Indiana, as soon as possible, giving the title of the proposed paper. The time required for the presentation should be stated (30-45 minutes).

(2) When the number of papers available is known, a selection will be made by the Committee, and the contributors will be advised as to whether their papers have been accepted. The program must be completed as soon as possible in order to assure the best possible arrangement of the papers and to provide adequate time for publicity.

(3) An abstract of the paper will be required in advance of the program. Contributors will be notified of the date on which this abstract is required.

(4) Copies of the completed paper must be in the hands of the Technical Program Chairman by the first week of August so that the necessary arrangements for prompt publication may be set in motion. Earlier submission will be appreciated.

(5) Papers must not be primarily of advertising or promotional character. However, the subject matter may consider commercial products, machinery, instruments, or processing procedures of a commercial nature, provided that they are evaluated from a technical viewpoint.

(6) The Technical Program Committee must be the final judge as to which papers are to be accepted, but every effort will be made to include all suitable contributions in the program.

1952 Intersectional Contest——

VARIABLES AFFECTING DYE FIXATION IN PADDING*

NEW YORK SECTION

COMMITTEE

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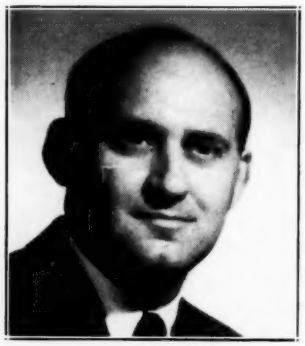

HARRY MOORE

Following a study of padding previously reported, the New York Section has now completed a study of the factors affecting the fixation of direct dyes in padding. The following variables were examined both in laboratory experiments and in large-scale runs in a mill:

1) Pretreatment of cloth.
2) Padding temperature.
3) Treatment of cloth after padding, especially batching.
4) Drying temperature.
5) Dyestuff classes.
6) Additions of solubilizing agents to pad liquor.

INTRODUCTION

IN a former paper, the New York Section made a preliminary study of some of the variables affecting pickup in padding. Using a great many different yarns and different cloth constructions, they found the effect of difference in temperature, pressure, and speed in the amount of liquor picked up in a mangle both with and without addition of a wetting agent to the pad liquor.

The particular aim of the committee which produced that paper was to determine the characteristics and performances of mill padders with respect to the influence of pressure and nip width on the pickup of pad liquor. Data on this subject were not available from any source, including the padder manufacturers themselves. The results reported by that committee can be considered important to an understanding of pickup performance of water or dye liquor and might conceivably be pertinent to pickup of pigment dye liquor, but their data offer no clue to diffusion and fixation of direct dyes in padding.

We have therefore decided to continue this work and to concentrate on the factors affecting fixation of direct dyes in padding.

In order not to duplicate any research previously reported in the literature, we instituted a search for pertinent references. Of these we found only a few relating to padding, but a great many which covered direct dyeing from dyebaths. It should be pointed out that the fundamental work done on the exhaustion of direct dyes on cotton and viscose has been done from long baths, such as are generally used in dyeboxes or in laboratory dye pots. These researches, mostly by British investigators, have covered the diffusion, exhaustion, and leveling properties of dyes in a regular jig-dyeing or box-dyeing procedure. Experiments relative to the fixation of direct dyes in padding have been reported in only a few instances.

One reference was a resume of an address given by G T Douglas (ICI Ltd) before the Manchester Section of the Society of Dyers and Colourists, discussing "Continuous Fixation Process for Water-Soluble Dyestuff" (*1*). Douglas said that he wished to confine his remarks to flat fabrics because, up to the present, no satisfactory method of dyeing crepe materials by continuous processing was known.

His comments on the application of direct dyestuffs to flat fabrics were as follows:

"First, the fabrics must be prepared very thoroughly to insure good absorbency. If the fabric had not good absorbency at least the absorbency should be uniform throughout the material. It was essential, too, that the dyestuffs have good solubility in this type of process, and electrolytes should be avoided since water soluble dyestuffs were lowered in solubility by their presence". Further, "in considering the padding conditions, solutions held at high temperatures would assure higher solubility of the dyestuff. High temperatures in achieving wetting out of the fabric were also advantageous. However, the rate of strike of water-soluble dyestuffs would increase with increasing temperatures and a compromise had to be effected. A suitable temperature was from 50-60°C (122-140°F), and to compensate for the reduced solubility of the dyestuffs at this lower temperature, one could add a solubility agent. In any padding treatment, the mangle used must be in perfect condition, a double nip being used to obtain a superior pad. The use of thickening agent so as to produce a more even pad was not to be advocated as fixation was impeded. Having padded, the best set-up was to have the padding mangle immediately in front of the ager and to pass the cloth directly from pad to the ager". Dealing with specific dyestuffs, Douglas spoke first on the application of direct dyestuffs to viscose rayon. Summarized, the experiments showed that some 20 dyestuffs of the Chlorazol and Durazol range gave good fixation in short steaming times comparable with that obtained by normal dyeing techniques. Of these 20 dyestuffs, 4 fell in Class A, 9 in Class B, and 7 in Class C, of the SDC classification, so that no one class predominated. As far as fastness properties were concerned, the dyed materials which had been steamed for 5 minutes exhibited light and wet fastness properties equal to the results obtained by conventional dyeing methods on both viscose and cotton.

J A Woodruff, in an article in the *American Dyestuff Reporter* in 1949 (2), discussed pad dyeing as follows:

"Pad dyeing allows little time for absorption of dye from dye liquor; depth of shade depends on concentration of dye in pad liquor. Class A dyes are excellent for coverage, fair for depth, and usually good for solubility. Class B and C dyes can be used in straight pad dyeing. In the high concentration of the pad liquor there is

* Presented at the Statler Hotel in Boston on Nov 8, 1952 by Harry Moore for the New York Section.

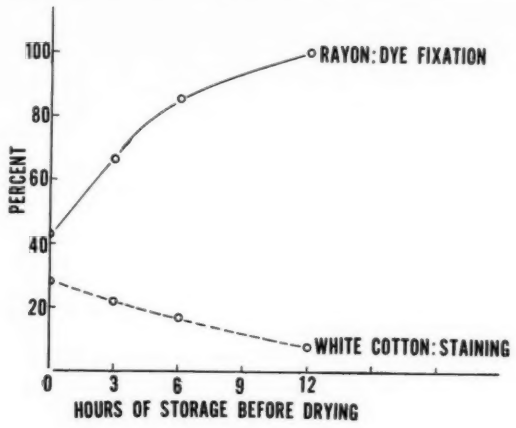

Figure 1
Direct Fast Blue 4GL (Pr 26)
Effect of Time of Storage

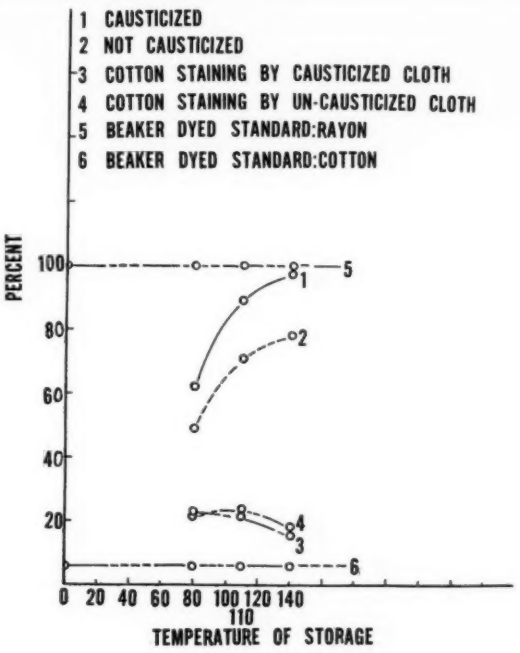

Figure 2
Direct Fast Blue 4GL (Pr 26)
Varying the Temperature of Storage

little need of added salt for exhaustion of Class B, but a long pad bath and high temperatures can be used to increase the depth of shade by preferential exhaustion of the dyes instead of the specific liquid pickup. Such conditions produce difficult feed-liquor adjustments because of inequalities in the exhaustion properties of direct dyes".

The classification of dyestuffs used by Woodruff and Douglas is similar to the one adopted by the Society of Dyers and Colourists from the work of their special Committee, which was reported in their journal (3). In this report, direct dyes were studied for migration or leveling power, salt controllability, influence of temperature on exhaustion of dye, and influence of liquor ratio on exhaustion. From a study of these factors, direct dyes were then classified as follows:

Class I—Dyes which level readily.

Class II—Dyes which are influenced in their level-dyeing properties by salt addition.

Class III—Dyes which are poor leveling and susceptible to the influence of salt but which can be controlled by temperature regulation.

The dyes of Class I exhibit, in general, the poorest fastness to water and washing, while the dyes of Class III exhibit the best wash fastness.

J A Woodruff also investigated the diffusion penetration of dyes of Classes I, II, and III to viscose rayon and cotton by studying their speeds of diffusion on filament-viscose-rayon cakes or spun-rayon packages at different temperatures, thus affording a method of predicting dyeing behavior of the individual dyes (2). This study appears to be the nearest approach to the behavior of dyes in padding which could be found in the literature.

EXPERIMENTAL

After reviewing the very scant literature on pad dyeing, we chose the following variables as subjects for further investigation:

1) Influence of pretreatment of cloth.
2) Influence of temperature of padding.
3) Influence of treatment of cloth after padding, particularly the effect of time of lay-up before drying.
4) Influence of temperature of drying.
5) Influence of dyestuff classes.
6) Influence of additions to padding liquor.

We selected one type of cloth, which is normally used for padding and which would present greater difficulty than a spun cloth. This type was a 92x64 pigment taffeta viscose rayon. Any results obtained on this cloth should be readily reproducible on other constructions. For the same reason we worked entirely with direct-dyeing colors, as the factors influencing their fixation in padding is not well known.

1) *Pretreatment of the cloth:* Our pretreatment was limited to what we would consider normal processing for pigment taffeta. Either a simple rope scour with a synthetic detergent and a polyphosphate, or a caustic pretreatment in open width preceded the rope scour. Since this type of cloth is not usually sized with starch, no enzyme desizing was necessary.

2) *Influence of temperature of padding:* We decided to pad at two different temperatures, 130 and 180°F. The former temperature was recommended by Douglas; the higher temperature is normally used in padding operations.

3) *Influence of treatment of cloth after padding, particularly the effect of time of lay-up before drying:* We were especially interested in the improvement in fixation of dyestuff from allowing material to remain in the wet state for varying lengths of time before drying. We also decided to check the effect of aging wet and dry goods in a rapid ager.

4) *Influence of temperature of drying:* Our interest in this variable was merely to see if a variation in the drying temperature had any effect on fixation of dyestuff. In actual practice the goods would necessarily be dried at a fairly high temperature.

5) *Influence of dyestuff classes:* In our trials we used representative dyestuffs from each of the three classes as set up by the SDC.

6) *Influence of addition to padding liquor:* To make any attempt to check all possible additions to the padding liquor would be a tremendous task. Since solubility of dyestuff appeared to be an important characteristic, we investigated only the effect of additions of solubilizing agents on fixation of color.

PROCEDURE FOR EXPERIMENT #1 ——Two 100-yard pieces of rayon pigment

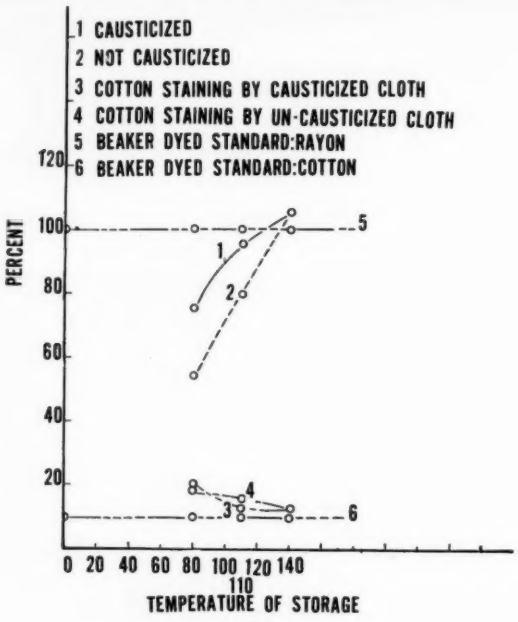

Figure 3
Direct Fast Pink 2BL (CI 353)
Varying the Temperature of Storage

taffeta, one causticized in open width at 100°F for 5 minutes and then boiled off, the other boiled off without caustic treatment, were sewn together and cut into 8-inch strips. Forty yards of a strip were used for each experiment as it was felt that smaller cuts could not imitate plant conditions closely enough. They were padded in a laboratory padder at 20 yards per minute, one dip and one nip, with sufficient pressure to give a 75% pickup. Light shades were padded with 0.5 ounce per gallon of each dyestuff. The rolls were allowed to remain in the padded state at room temperature for 0, 3, and 24 hours. Samples were taken from each of the rolls at the varying times and were dried at room temperature, 120°F, and 240°F. Three colors were used:

Direct Pink 2BL	CI 353
Direct F Blue 4 GL	Pr 26
Diphenyl F Blue Green BL	Pr 470

Thus the three colors, padded at two different temperatures and each with three different laying times and each of these then dried at three different temperatures, resulted in 54 different padding experiments and necessitated 108 different wash tests, since both causticized and uncausticized material were used. The various samples were washed and evaluated for wash fastness at 120°F according to AATCC Wash Test #2.

Effect of pretreatment: Causticized samples were always deeper in shade than uncausticized samples. These two methods of handling showed sufficient variation to

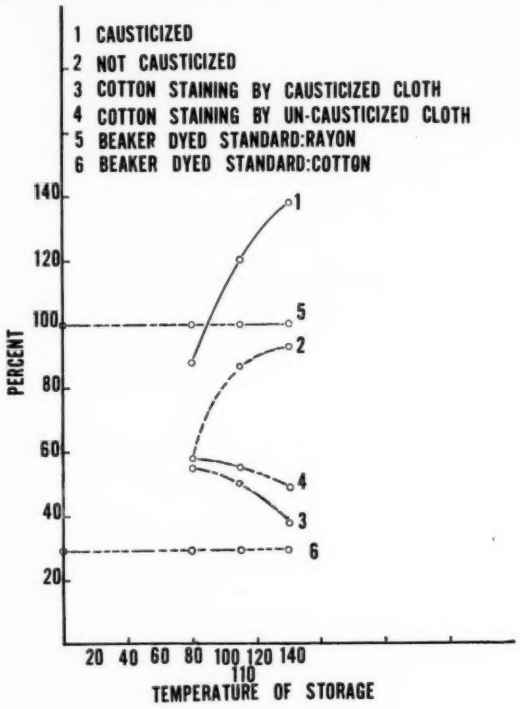

Figure 4
Direct Fast Grey LVGLA (Pr 379)
Varying the Temperature of Storage

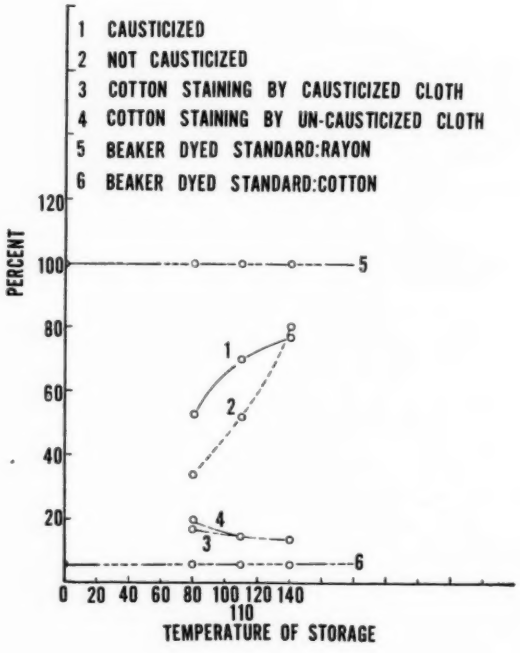

Figure 5
Direct Fast Blue Green BL (Pr 470)
Varying the Temperature of Storage

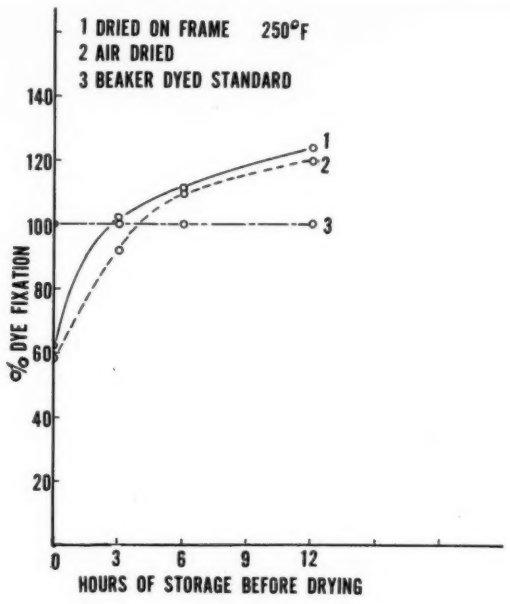

Figure 6
Direct Fast Blue 4GL (Pr 26)
Effect of Various Procedures on Dye Fixation

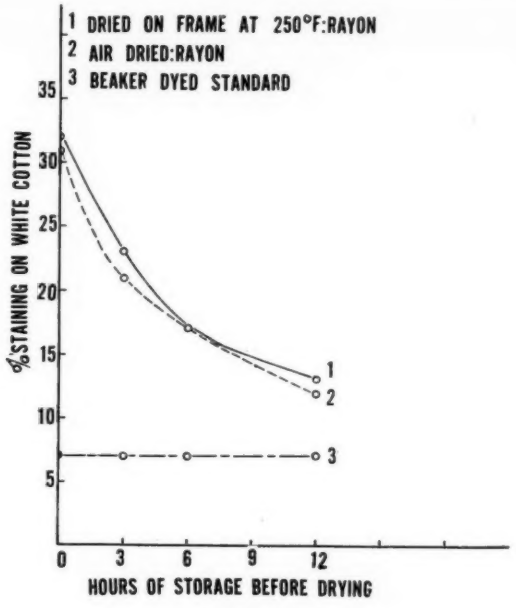

Figure 6A
Direct Fast Blue 4GL (Pr 26)
Effect of Various Procedures on Staining Tendency

warrant their being carried through all our future experiments. Both in our initial experiments and in those carried on subsequently with new pieces, causticizing almost invariably gave a fuller and brighter shade. This difference in color value was maintained on the washed samples, indicating that more color had been picked up from the bath and fixed on the cloth.

Influence of padding temperature: The effect of the temperature of the pad liquor on the amount of color fixed on the cloth was not consistent. Pink 2 BL was more satisfactory at the high temperature; Blue 4 GL gave generally better results at the low temperature.

Laying up before drying: The wash fastness of all the samples that remained in the padded state from 0-3 hours was very poor. Those that were allowed to remain for 24 hours before drying were markedly better.

Influence of the temperature of drying: The temperature of drying appeared to have no effect on the results. The samples dried at 80, 120, and 240°F exhibited equal wash fastness.

PROCEDURE FOR EXPERIMENT #2 ——This experiment increases the range of dyes tested. Three hundred yards of causticized and 300 yards of uncausticized goods were cut into 8-inch strips. Ten yards of each was sewn together to make one roll. The padding procedure was the same as that used in our first trials. The rolls were allowed to remain for 3, 6, 12, and 24 hours in a sealed container at room temperature before drying. Immediately after padding, samples taken from the roll were run through a rapid ager for 10 minutes before drying. All of the rolls were dried at 240°F.

The following colors were used:

Direct Fast Pink 2 BL	CI 353
Chrysophenine G	CI 365
Brilliant B Violet B	Pr 35
Direct F Black L	Pr 24
Direct F Scarlet 4 BS	CI 327
Direct Sky Blue FF	CI 518
Trisulfon Brown B	CI 561
Direct F Blue 4 GL	Pr 26
Diphenyl F Blue Green BL	Pr 470
Benzo F Blue 8 GL	Pr 27

A 0.25% beaker dyeing of each color was made to be used as a standard for shade and wash fastness. For 10 dyes at two different padding temperatures and four different laying times, 80 different paddings and 160 wash tests were required, not including the beaker dyeings and aged samples. Spectrophotometric readings were made on all washed samples.

Influence of temperature of padding liquor: The effect of the temperature of the pad liquor on the amount of color fixed on the cloth was not consistent. In most cases high-temperature padding gave brighter shades and somewhat better fixation; however, there were many exceptions.

Time of lay-up before drying: Here the results were consistent enough to indicate that there was a definite advantage in allowing the goods to remain in the padded state before drying. The fixation of the color with immediate drying was very poor. With only a few individual exceptions, fixation consistently improved up to 12 hours of lying time.

Although a great deal of time and effort was expended on the second series of experiments, the results did not exhibit a definite trend. We do not think the conclusions are significant enough to discuss the spectrophotometric charts that were made from the washed samples; there are too many contradictions and exceptions.

The only positive statements we can make regarding the experiments are that a caustic treatment always gives a deeper shade, high temperature padding usually gives a brighter shade, and laying up of the goods improves the washfastness (however, the improvement is only relative). In almost every case padded samples are much duller in shade and much poorer in wash fastness than beaker dyeings. Blue Green BL and Blue 8 GL, Class III colors, are particularly poor both in shade and wash fastness, whereas they normally are good to washing. Vat aging shows some improvement in fixation and brightness of almost all of the colors, but aged dyeings are still markedly inferior to beaker dyeings.

We decided at this point to restrict our experiments to only those colors which showed good washability for beaker dyeings, such as Blue Green BL, Blue 4 GL, and Pink 2 BL. We hoped to improve fixation of these colors in padding operations, which gave fairly fast results. The poor ones, such as Chrysophenine, we gave up as a needless effort.

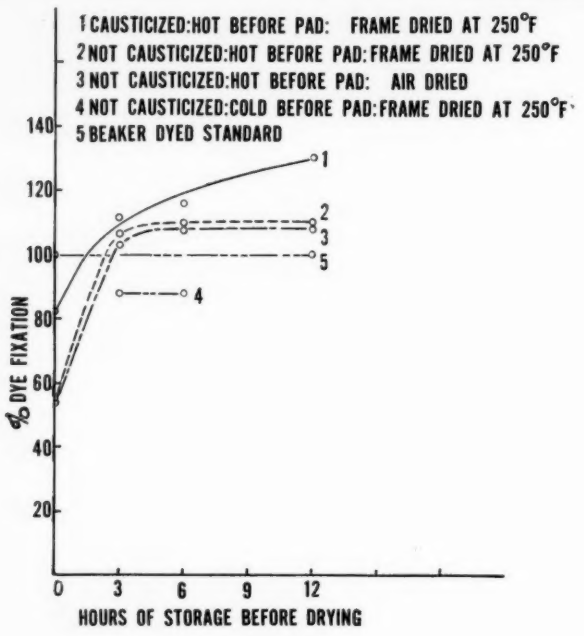
1 CAUSTICIZED:HOT BEFORE PAD: FRAME DRIED AT 250°F
2 NOT CAUSTICIZED:HOT BEFORE PAD: FRAME DRIED AT 250°F
3 NOT CAUSTICIZED:HOT BEFORE PAD: AIR DRIED
4 NOT CAUSTICIZED:COLD BEFORE PAD: FRAME DRIED AT 250°F
5 BEAKER DYED STANDARD
% DYE FIXATION
HOURS OF STORAGE BEFORE DRYING

Figure 7
Direct Fast Pink 2BL (CI 353)
Effect of Various Procedures on Dye Fixation

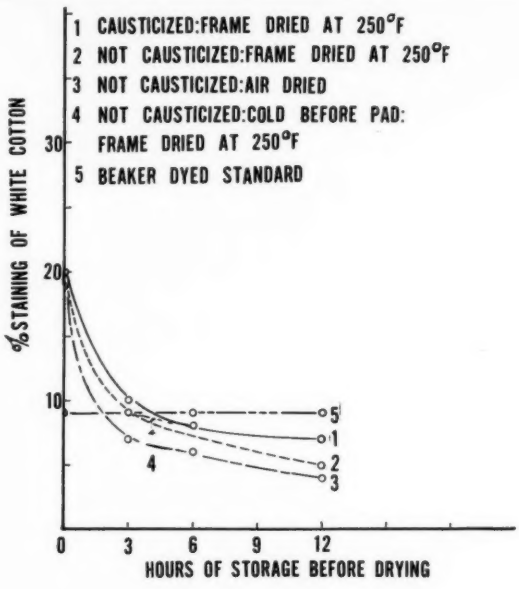
1 CAUSTICIZED:FRAME DRIED AT 250°F
2 NOT CAUSTICIZED:FRAME DRIED AT 250°F
3 NOT CAUSTICIZED:AIR DRIED
4 NOT CAUSTICIZED:COLD BEFORE PAD: FRAME DRIED AT 250°F
5 BEAKER DYED STANDARD
% STAINING OF WHITE COTTON
HOURS OF STORAGE BEFORE DRYING

Figure 7A
Direct Fast Pink 2BL (CI 353)
Effect of Various Procedures on Staining Tendency

PROCEDURE FOR EXPERIMENT # 3 —These tests were run to check the influence of additions to the padding liquor. From the work of Douglas, previously quoted (*1*), it has been determined that it is essential to have dyestuffs in the best possible solution for padding, and that electrolytes should be avoided since the solubility of dyes is lowered by their presence. Thus, additions of electrolytes could not be considered as worth of study. However, any chemical or substance that might conceivably aid in absorbency, diffusion, or migration of dye could aid fixation of dyestuff.

To this end we studied the effect of many agents on the solubility of one of the most sparingly soluble of the dyes of Class III, Diphenyl Fast Blue Green BL. This dye, while yielding fast-to-light and fast-to-washing dyeings, had not fixed well in our earlier padding trials, and we hoped to improve its fixation by some auxiliary in the pad liquor. We studied the effect of the following agents:

Solvents: Diethylene glycol, Carbitol, Cellosolve, glycerine, pyridine, mono-, di-, and triethanolamine, diethylethanolamine, dimethylethanolamine, thiodiethylene glycol.

Hydrotropic Agents: Urea, benzylsulfanilate of soda, naxonate.

Dispersing Agents: Tamol, Dekol, Nekal.

Alkalies: Ammonia, tetraethylammonium hydroxide. In improving the solubility of this dyestuff, we found diethylethanolamine particularly effective in its ability to keep a 5% solution perfectly clear even after cooling. Monoethanolamine was also good in this respect.

We padded four dyes with and without the addition of diethylethanolamine at 0.5 ounce dyestuff and 2.5 ounces solvent per gallon:

Blue Green BL	Pr 470
Blue 4 GL	Pr 26
Grey LVGLA	Pr 379
Blue 8 GL	Pr 27

The temperature of the pad liquor was 180-185°F, and the padded rolls were stored in sealed tins and kept at 150°F. After 0, 6, and 12 hours laying times samples were cut off and dried.

A further padding of Blue 4GL was run at 130°F and stored like the others.

Further, Blue Green BL was padded with 2.5 ounces Tamol per gallon to see the effect of a dispersing agent as opposed to a solvent.

Wash tests were made at 120°F against white cotton, with dyed samples as standards. The dyed samples were made by cutting swatches of the padded pieces and dyeing out in a salt bath to exhaustion.

The results of these experiments were in marked contrast to our previous work. The visual appearance of the paddings was brighter, very close in shades to the dyed standards. The wash-fastness tests were also definitely better the longer the paddings were stored, the 12-hour laying time showing tests very close to the dyed standards in shade and fixation. This was attributed to the higher temperature of the rolls during storage, i e, 150°F as against room temperature in the earlier experiments.

The addition of the solvent, diethylethanolamine, showed a significant trend in that it lowered the time of laying required to show increased fastness, this being particularly noticeable in the case of the Grey LVGLA. The Tamol addition showed no effect.

Tests were made with 3 dyes, Orange RGL, Blue Green BL, and Blue 4GL, storing the rolls at 180°F after padding. Fastness tests showed the dyes were fixed as well as when dyed, but this high temperature of storing is not feasible in a practical way.

PROCEDURE FOR EXPERIMENT #4 ——As our fourth padding experiment we decided to make a practical run in a plant with an 800-yard roll of pigment taffeta (approximately 10 pieces), boiled off without a caustic treatment. Padding was carried out with 0.5 ounce of Blue 4GL per gallon of pad liquor at 186°F on a 2-roll immersion pad with 1 dip and 1 nip at 5 tons pressure at 50 yards per minute, and with a pickup of 75%. One piece of 80 yards was dried immediately on an enclosed frame at 250°F; two pieces, after 3 hours laying time; two more, after 6 hours laying time; and the remainder, after 12 hours laying time.

We checked the temperature of the padded material as it was being batched up with a contact pyrometer. Although the

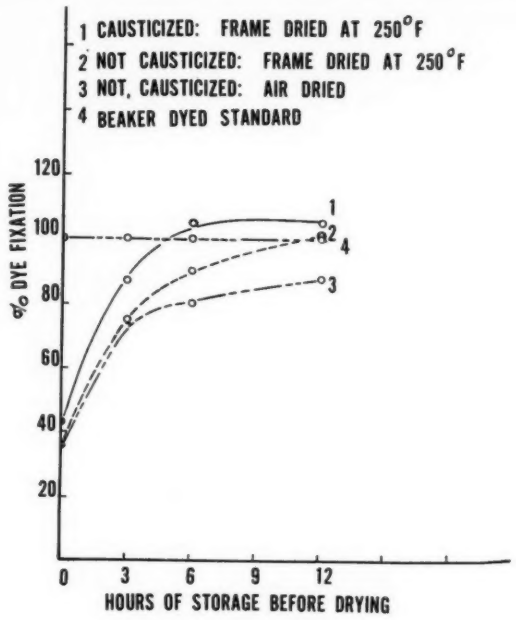

Figure 8
Direct Fast Grey LVGLA (Pr 379)
Effect of Various Procedures on Dye Fixation

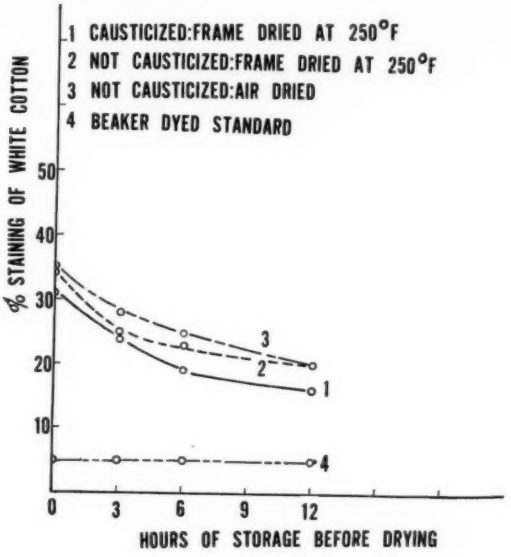

Figure 8A
Direct Fast Grey LVGLA (Pr 379)
Effect of Various Procedures on Staining Tendency

pad liquor was at 186°F, the temperature of the padded material was only 125°F. After 3 hours the temperature of the roll dropped to 100°F; after 6 hours the temperature still remained at 100°F. Samples were taken from the seam inside the roll; on the pieces stored for 12 hours, a sample was taken from next to the last piece. Spectrophotometric readings were made of the washed samples taken from the different pieces, and the results were graphed in Figure 1.

The results shown on Figure 1 indicate a sharp increase in fixation with increased laying time. The visual appearance of the pieces is good and the wash fastness and shade of the 12 hours material is comparable to a beaker dyeing.

After noting the very sharp drop in the temperature on the padded roll as it was being batched, much larger than we had anticipated, we felt that we might have the explanation for the poor results obtained in our first two experimental trials.

Although we had anticipated an increase in fixation of color when the rolls were batched wet, we had overlooked the effect of temperature on fixation of color. The first experimental rolls were batched at practically room temperature, so that the migration and fixation of the color were necessarily poor.

PROCEDURE FOR EXPERIMENT # 5 ——To check the effect of temperature on the fixation of the color after padding, we padded four colors, Pink 2BL, Blue Green BL, Grey LVGLA, and Blue 4GL,,at 180°F on causticized and uncausticized material. The rolls were maintained at 80, 110, and 140°F for 6 hours in sealed containers. Spectrophotometric readings were made of the wash tests. The results, tabulated on Figures 2, 3, 4, and 5, show, in all cases, a sharp increase in fixation of color when the padded rolls were kept at the higher temperature.

PROCEDURE FOR EXPERIMENT #6 ——To conclude our padding experiments we made a practical run with four colors, Pink 2BL, Blue Green BL, Blue 4GL, and Grey LVGLA on four rolls of pigment taffeta, each 850 yards in length (approximately 10 pieces). In order to obtain the highest possible temperature in the padded rolls during storage, the rolls were preheated on dry cans immediately before padding. Two pieces on two of the rolls were padded without preheating for purposes of comparison.

Included in the rolls were causticized and uncausticized material. The rolls were not all run at the same time, but we tried to maintain the same padding conditions in all the rolls.

Procedure: One-half ounce per gallon of color, pad liquor at approximately 185°F, 1 dip and 1 nip on a 2-roll immersion pad with 5 tons pressure. The goods were run at 70 yards per minute. Temperature before padding, 180-190°F; temperature of batching up 135°F. On standing, the temperature dropped to approximately 110°F.

At this time we also checked the effect of drying at different temperatures. Samples removed from the roll were air-dried and then compared with the frame-dried material. The appearance and washfastness showed no significant difference.

As in our previous practical run, one piece was dried immediately; two pieces, after 3 hours; two more, after 6 hours; and the remainder, after 12 hours. Spectrophotometric readings were made on wash tests of all of the various samples, and the results were tabulated on Figures 6-6A, 7-7A, 8-8A, and 9-9A. With all of the colors the results corroborated our previous plant trial with Blue 4GL, namely, that there was consistent improvement in fixation of color on laying up.

PROCEDURE FOR EXPERIMENT #7 ——Samples of 20 padded and dried rolls were run through the vat ager for 8 minutes. Wash tests were made in comparison with the unaged portions. The results indicated that no increase in fixation resulted from the aging operation.

CHARTS

The charts on the following pages tabulate the spectrophotometric readings obtained from the various padded samples after being washed at 120°F in accordance with AATCC Wash Test #2.

When the samples that have been padded with the same concentration of color are matched against a standard, a higher reading indicates a deeper shade with less color

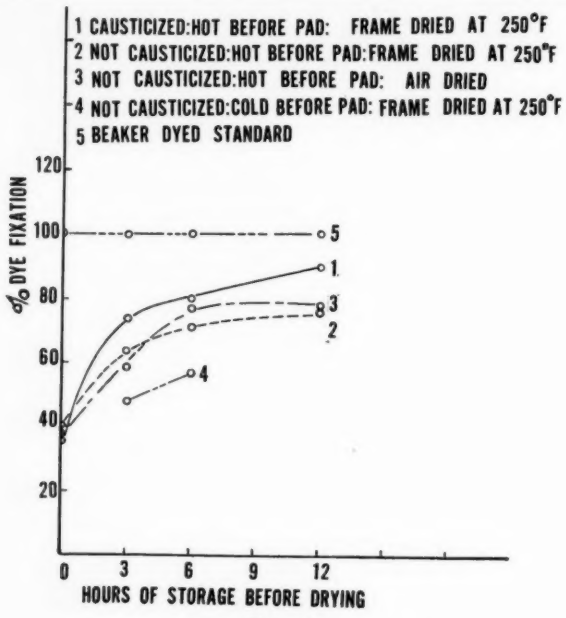

Figure 9
Direct Fast Blue Green BL (Pr 470)
Effect of Various Procedures on Dye Fixation

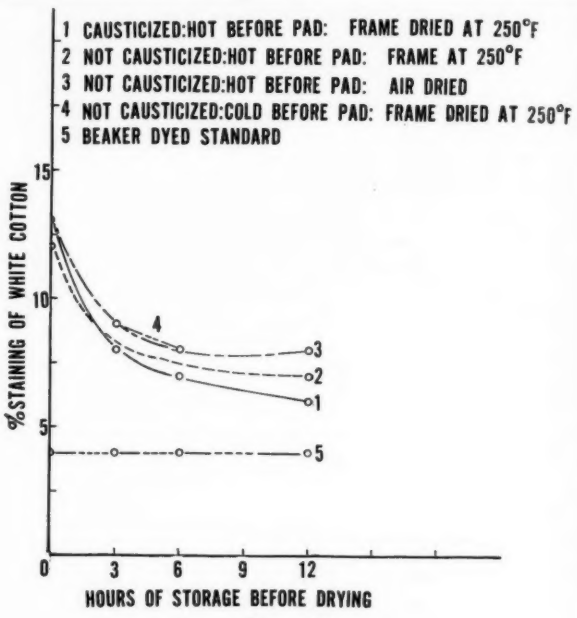

Figure 9A
Direct Fast Blue Green BL (Pr 470)
Effect of Various Procedures on Staining Tendency

washed off in the wash test. Similarly, in comparing the staining of the white cotton used in the wash tests, a lower reading in the spectrophotometer indicates less staining of the cotton. Therefore, in our charts, a rising curve for the padded rayon samples, combined with a falling curve for the white cotton, is indicative of an increase in fixation of color on the padded samples.

The standards used in Figures 2, 3, 4, and 5 are beaker dyeings of the same material with approximately the same amount of color. The standards used in Figures 6-6A, 7-7A, 8-8A, and 9-9A, are samples taken from the padded rolls and boiled with 10% salt for 1 hour. The stained cotton used for reference are the cotton swatches used in the wash tests of the standards.

Figure 1, described in Experiment #4, shows the increase in fixation of color obtained when the pieces on the padded roll (850 yards) were stored for 0, 3, 6, and 12 hours, respectively. One hundred (100) on the chart is the reading obtained from the pieces that were stored for 12 hours. None of the material was causticized.

Figures 2, 3, 4, and 5, described in Experiment #5, tabulate the increase in fixation obtained when the laboratory-padded samples were stored for 6 hours in sealed containers at varying temperatures (80, 110, and 140°F). Causticized and uncausticized material were used in the experiment.

Figures 6-6A, 7-7A, 8-8A, and 9-9A, described in Experiment #6, are the results obtained in the plant runs with four colors. The padded rolls were preheated on dry cans before padding. A few pieces were padded without preheating and were therefore at room temperature. Included in the rolls were causticized and uncausticized material. Samples were removed from some pieces before drying on the frame. They were allowed to dry at room temperature in order to compare the difference in fixation due to the method of drying.

SUMMARY

In summarizing, it is obvious that our conclusions are based on the results obtained with the representative dyestuffs used. However, the results obtained in the latter trials, particularly the practical runs on plant equipment with 850-yard rolls, were so uniformly consistent that we believe they are indicative of the improvement in fixation obtainable with the general range of colors that are regularly used in padding.

INFLUENCE OF PRETREATMENT OF CLOTH——The effect of a caustic treatment of the pigment taffeta was very apparent. In all cases, causticizing gave a fuller and brighter shade. In spite of the heavier shades of the causticized material, fastness tests indicated that the fixation of color was at least as good as, and in many cases better than, that obtained on comparable uncausticized samples.

It might be pointed out that differences from caustic pretreatment would vary with the methods used in causticizing the material.

INFLUENCE OF THE TEMPERATURE OF PADDING——Actually, the temperature of padding, when the material is dried immediately after padding, makes very little difference. Only when the padded rolls are laid up before drying has the temperature of padding any importance, in which case the temperature has a definite bearing on the results.

LAYING UP BEFORE DRYING——The time of laying up after padding is an important factor in the fixation of direct dyes. There is a sharp increase in fixation in the first six hours of storage, after which there is a gradual improvement in fixation for a further six hours.

The higher the temperature maintained within the padded roll the more rapid and more complete is the color fixation and the shorter the laying-up time required to obtain satisfactory fastness.

Therefore, any means that can be employed to produce a high temperature of padding and to maintain the highest temperature possible in the stored roll will increase dye fixation.

Drying immediately after padding did not give good fixation in any instance.

INFLUENCE OF TEMPERATURE OF DRYING——We did not observe any significant difference in the color fastness or shade of any of the samples dried at tem-

peratures varying from room temperature to 250°F.

Although the spectrophotometric readings of the wash tests showed minor variations, the differences were slight. As the samples dried at higher temperatures were not, in all cases, better than those that were air dried, we concluded that temperature of drying has very little effect on color fastness.

INFLUENCE ON DYESTUFF CLASSES——The colors we selected for experimentation were chosen from each of the three classifications as adopted by the Society of Dyers and Colourists. In our later trials only those direct colors which were considered to have good wash fastness were selected. Most of these colors would normally fall in Classes II and III.

In our plant runs, colors from each of the classes gave excellent results. The levelness, shade, and color fastness were just as acceptable as the beaker-dyed samples.

The improvement was particularly significant with the Class III colors, which, in our preliminary padding trials, exhibited dull shades of poor washfastness.

INFLUENCE OF ADDITIONS TO THE PADDING SOLUTION——Since we achieved good fixation without any additions to the padding solution, we did not continue our experiments beyond the original trials.

One solvent, diethylethanolamine, which was selected because it was the most effective in improving the solubility of Direct Fast Blue Green BL, gave indications that it might speed up the fixation of some colors.

Out of the four colors tried, Grey LVGLA showed the most outstanding improvement from the addition of diethylethanolamine.

We believe our padding experiments of storing the rolls before drying and keeping the rolls as warm as possible has suggested a new approach toward good color fixation on padded materials. We also feel that this technique could be applied to all cellulosic materials and possibly to acetate rayon, besides the viscose-rayon fabric which we used.

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Membership Applications

December 31, 1952

SENIOR

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William J Mooney—Executive Secretary, Pennsylvania Assn of Dyers & Cleaners, Harrisburg, Pa.

E Geoffrey Nathan—E Geoffrey Nathan, Yarns, Boston, Mass.

Grigsby C Peabody—Export Sales, Dyes, American Cyanamid Co, New York, N Y.

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CORPORATE

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Kelco Company

APPLICATIONS FOR TRANSFER TO SENIOR MEMBERSHIP

Eugene Eckert
Moses Sparks, Jr

January 13, 1953

SENIOR

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John W Berg—Chemist, Sales Service Lab, Alco Oil & Chemical Co, Philadelphia, Pa.
Ignatius L Blanchard—Sales, Kelco Company, New York, N Y.
Walter J Loughran, Jr—Sales Engineer, Minneapolis-Honeywell Regulator Co, Providence, R I.
Sebastian B Mecca—Chemical Director, Schuylkill Chemical Co, Philadelphia, Pa.
Edwin O Norvell—Sales Representative, Proctor Chemical Co; Salisbury, N C.
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Barry Goldstein—Philadelphia Textile Institute. Sponsor: W H Hughes.

CORPORATE

Kelco Company
North Carolina State College

APPLICATION FOR TRANSFER TO SENIOR MEMBERSHIP

Benjamin H Brinkley, Jr
John H Davids
Chester J Kurowski
David E Terry

—◆ ◆—

Hudson-Mohawk Section Meeting Reports

October 31, 1952
Hotel Utica, Utica, N Y

FORTY members attended the October 31st meeting at the Hotel Utica, Utica, New York. Cecil Wills, Assistant General Superintendent of the New York Mills Division, A D Julliard and Company, Inc, presented a paper entitled "Modern Conception of Cotton Fibers Relative to Its Processing."

Mr Wills' paper encompassed the modern ideas on the progressive growth and development of the individual cotton fibers and the influences on bleaching, dyeing and finishing processes. The paper was on the practical side, delving into causes of dead and immature cotton, and what to do about it. Shrinkage control and mercerization were discussed in some detail.

December 5, 1952
Jack's Restaurant, Albany, N Y

THE Section held its final meeting of the 1952 calendar year on December 5, 1952 at Jack's Restaurant, State Street, Albany, New York.

The technical program featured the presentation of a paper by Hugh M Mosher, Research Chemist, Arkansas Company, Newark, N J, entitled, "The Use of Resins and Plastics in Textile Finishing." Dr Mosher's talk was concerned primarily with resins of the urea-formaldehyde groupings and their application as weighting agents, crush retardents, dimensional control finishes, antistatic agents, water repellents and softeners.

Albert Herrmann, General Aniline Works, Rensselaer, N Y, was elected Councilor for the calendar year 1953. Harold Ronson, W Lowenthal Company, Cohoes, N Y, was elected to the Sectional Committee replacing Victor Krukonis, who moved from this section. All other officers were re-elected to serve until June 19, 1953 when new officers elected at the May 8, 1953 meeting will assume their duties. Future officers will be elected so as to assume their duties at the Annual Outing and will serve until the following Annual Outing, with the exception of the Councilor, who will serve for the calendar year. However, the election of councilor will take place at the same time as other officers. 55 members attended this meeting.

Respectfully submitted,
WILLIAM A NELSON, *Secretary*

NEWS

• ACS Symposium on Textiles

A Textile Symposium is being sponsored by the Chemical Marketing and Economics Division of the American Chemical Society during its 123rd national meeting the week of March 16th-20th in Los Angeles, California. The Symposium will be held on March 18th at the Hotel Statler. The program follows:

A TEXTILE INDUSTRY FOR THE WEST

(With Emphasis on Fibers from Cellulose)

Morning Session:

9:30—Opening Remarks—A George Stern, Heyden Chemical Corp, San Francisco, California.

9:40—"The Need for a Western Textile Industry"—Charles L Hamman, Stanford Research Institute, Palo Alto, California.

10:10—"Chemical Raw Materials"—Edwin L Lovell, Rayonier, Inc, Shelton, Washington.

10:40—"Textile Raw Materials"—Simon Williams, Fabric Research Laboratories, Inc, Boston, Massachusetts.

11:10—"Water Requirements"—Roger Truesdail, Truesdail Laboratories, Inc, Los Angeles, California.

Afternoon Session:

2:15—"The Textile Industry Looks Ahead"—Milton Harris, Harris Research Laboratories, Washington, D C.

2:45—"The Manufacture of Textile Fabrics"—Graeme G Whytlaw, American Viscose Corp, Marcus Hook, Pennsylvania.

3:15—"Dyestuffs and Finishing Chemicals"—Sidney M Edelstein, Dexter Chemical Corp, New York, New York.

3:45—"Investment Involved and Financing"—Emery Cleves, Celanese Corp of America.

4:15—"Operating Costs, Including Labor"—Frank P Bennett, III, *America's Textile Reporter,* Boston, Massachusetts.

Comments from the floor will be welcomed after each paper is presented. Additional details may be obtained from A George Stern, Symposium Chairman, Heyden Chemical Corporation, 420 Market Street, San Francisco, California.

• New Southern Offices for Metro-Atlantic

Metro-Atlantic, Inc have announced the opening of new Southern headquarters at 1210 New Buncombe Road, Greenville, South Carolina. Henry Papini, Vice-President of Metro-Atlantic, Inc and its subsidiary, Metro Dyestuff Corporation, will be in charge and will direct laboratory, office, and warehouse functions from the above address.

The new headquarters in Greenville will carry complete stocks of all Metro-Atlantic products as well as the full line of Metro's dyestuffs and pigments.

A View of the new Southern Offices of Metro-Atlantic, Inc

• National Aniline Acquires 600-Acre Tract in Virginia

National Aniline Division, Allied Chemical and Dye Corporation, has acquired a six-hundred-acre tract north of Hopewell, Virginia, on the James and Appomattox Rivers, where work will begin immediately on a new $27,000,000 plant for the manufacture of staple fiber and continuous filament nylon, it is learned. Nylon polymer will also be produced in suitable form for molding into plastics.

The plant will consist of a series of one- and multiple-story buildings to include process machinery and a complete unit for 20,000,000 pounds per year production of nylon based on the Caprolactam Polyamide process, it is reported. General contractor for the project is Daniel Construction Company, Greenville, S C, and Birmingham, Ala.

The project will include a power house, pumping station and other mechanical units. Completion is expected in about 24 months.

• Beacon Management Counselors Formed

Roger M Allen and Loring W Carney have formed a partnership to practice industrial management consulting work under the name Beacon Management Counselors. The new firm began operations on January 1st with offices in Boston, Mass and Winthrop, Me. Both men long have been actively associated in the field, most recently as vice presidents, and directors of Barnes Textile Associates, Inc.

O Thomas Austin, formerly with A D Julliard & Co, Inc will be associated with the new group in its Maine division.

A Frederick Allen, until recently with M T Stevens & Sons Co, Division of J P Stevens & Co, Inc will also be associated with the new group in the Boston division.

One of the policies of the new company, its founders state, is to provide a consulting management service tailored to meet the requirements of the smaller manufacturing units as well as to offer a complete service to the larger concerns.

• TTFC to Increase Activities

With the receipt of a charter under the Dominion Companies Act of January 28th, the Textile Technical Federation of Canada is going ahead with plans for increased activity in the future.

From headquarters in Montreal the Federation coordinates the scientific and educational work of five textile technical societies with branches in Ontario and Quebec and a membership of about 800 chemists, weavers, dyers and other technicians.

The particular success of the Canadian Textile Seminar, one of the Federation's major projects, brought about discussion of further activities at TFFC's winter meeting at Hamilton, Ont, on February 7th.

J W Millichamp, Canadian Cottons, Ltd, Montreal, is president of the Federation.

• 8th Purdue Industrial Waste Conference

The Eighth Purdue Industrial Waste Conference, a meeting where scientists from industry and government meet to discuss mutual problems encountered in the disposal of waste materials that may result in the pollution of air or water, will be held May 4-6 in the Purdue University Memorial Union Building, Lafayette, Ind. Hotel reservations should be made at the Purdue Union Club, the Fowler Hotel, the Cedar Crest Hotel or the Morris Bryant Hotel. If accommodations cannot be secured at any of these, arrangements to stay in private homes can be made by writing the chairman, Don E Bloodgood, at Purdue University.

Because of the large number of papers that will be presented concurrent sessions will run in order to get them all presented.

Efforts are made to obtain papers that describe up-to-date information on the progress being made in the disposal of industrial wastes. Historical or review papers may be presented but every effort will be made to have papers so indicated by appropriate titles.

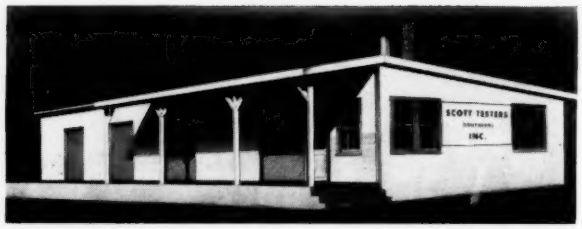
Registration is open to anyone interested in waste disposal. The fee for attendance will be approximately ten dollars.

The Proceedings for the Seventh Conference are now available at $1.25 from Dean A A Potter, Schools of Engineering, Purdue University, Lafayette, Indiana.

• Department of Agriculture Scientists Visit LTI

John F Scanlon, in charge of the Chemistry Section of the Animal Fats Division, and Waldo C Ault, head of the Eastern Regional Research Laboratory of the U S Department of Agriculture, Bureau of Agricultural and Industrial Chemistry, Philadelphia, recently visited Lowell Textile Institute as guests of the Research Foundation.

The Research Foundation has undertaken for the Bureau of Agricultural Economics an economic survey of actual and potential uses of the by-products of the wool scouring industry. Dr Scanlon and Dr Ault have made an extensive study of the physical and chemical properties of wool grease, and the results of their work will be utilized by the Foundation in its investigation of current and future markets. Collection of data for other phases of the project—the production and refining of wool grease—has been under way since September 1952 under the supervision of Prof Stuart L Mandell who is being assisted by Robert S Raymond of the Foundation staff.



Scott Testers (Southern) Inc Servicing Center

• New Southern Servicing Center for Scott Testers

Scott Testers, Inc, Providence, R I, have announced the appointment of Scott Testers (Southern) Inc, 216 Reidville Road, Spartanburg, S C, as the authorized source of servicing, repairs, supplies and parts for Scott testing equipment in use in textile mills and other industries in the southeast. This appointment is effective March 1, 1953.

Scott Testers (Southern) will maintain a complete stock of factory-made parts and supplies. Its facilities include a machine shop capable of completely rebuilding Scott Testers.

The establishment is under the direction of John Hargreaves, and will be staffed with factory-trained personnel available to travel to the mills for such servicing as can be done there—or for transporting equipment to the shop for servicing, rebuilding and modernization more extensive than it is advisable to perform within the mill. Conversion of existing equipment to the new Scott "Accr-O-Meter" Constant-Rate-of-Extension Weighing System can also be accomplished by this personnel, it is stated.

It is emphasized that Scott Testers (Southern) will devote its activities to furnishing service, parts and supplies for existing installations. This arrangement in no way affects the status of John Klinck of North Augusta, S C, who for many years has represented Scott Testers, Inc. Present policies and representation will be retained with reference to sales of new equipment and engineering assistance to customers and prospective customers on new problems concerning physical testing.

• Carbide Announces Lower Price for Ethylene Diamine

A new lower price for ethylene diamine has been announced by Carbide and Carbon Chemicals Company, a Division of Union Carbide and Carbon Corporation. The price reduction (three cents per pound) also applies to a new puree product now available. The amount of ethylene diamine contained in the product has been increased from 76 per cent to 85-88 per cent.

The new prices for ethylene diamine, 85 to 88 per cent are as follows:

Eastern Territory (East of Idaho, Utah, and Arizona)

In tank car or compartment tank car lots—44c per pound of contained diamine.

In less than carload lots in 55-gallon drums—47c per pound of contained diamine.

Western Territory (West of Montana, Wyoming, Colorado, and New Mexico)

In tank car or compartment tank car lots—45c per pound of contained diamine.

In less than carload lots in 55-gallon drums—48c per pound of contained diamine.

All shipments of 55-gallon drums or more are f o b delivery point of rail carrier nearest point of destination of shipment in the U S as the Eastern and Western territories are so defined above.

• GAF Announces Price Reduction

General Aniline & Film Corporation has reduced its development price of PVM (Polyvinyl Methyl Ether) to 40 cents per pound, according to an announcement by Jesse Werner, GAF's Director of Commercial Development. It is being produced on a semicommercial scale and further reductions are anticipated when commercial production is achieved.

Technical data and a price schedule on PVM, a tacky, soluble polymer, are available from GAF's Commercial Development Department, 435 Hudson Street, New York, N Y

• Training Course in Water Pollution Abatement

An advanced training course for sanitary engineers in water pollution abatement programs will be held March 2-13 at the Environmental Health Center, 1014 Broadway, Cincinnati 2, Ohio. Letters of application should reach the Chief, Specialized Sanitation Training Section, Environmental Health Center or the appropriate Public Health Service Regional Office as early as possible.

The Course agenda follows:

Date & Time	Subject	Speaker
Monday—March 2		
8:30- 9:20	Registration and Welcome	E P Dubuque
9:30-10:30	Development of the B O D Test and Use of the Equations	H P Kramer
10:40-11:40	Significance of the B O D Test	H P Kramer
1:00- 1:45	The Dissolved Oxygen Determination	H P Kramer
1:50- 2:20	The Polarographic Method for the Measurement of Dissolved Oxygen	H P Kramer
2:20- 2:40	Demonstration—Polarograph	D G Ballinger
2:45- 2:55	Objectives for the Laboratory on Dissolved Oxygen	L J Kamphake
2:55- 4:30	Laboratory—Determination of Dissolved Oxygen in the Presence of Interfering Substances	Training Staff
Tuesday—March 3		
8:30- 9:30	Industrial Waste Survey	G N McDermott
9:40-10:40	Water Quality Objectives	P D Haney
10:50-11:50	Panel Discussion	
1:15- 2:15	Fundamental Reaction of Sewage Purification	C C Ruchhoft
2:25- 2:35	Objectives for the Laboratory on B O D	D G Ballinger
2:35- 4:30	Laboratory—B O D on Industrial Waste Samples	Training Staff
Wednesday—March 4		
8:30- 9:30	Introduction to Statistical Methods	H P Kramer
9:40-10:40	Theory of Measurements	E K Harris
10:50-11:50	Application of Statistical Methods	H P Kramer
1:15- 2:15	Public Health Significance of Water Pollution Control	Consultant
2:25- 3:25	Organization of a State Water Pollution Control Program	Consultant
3:35- 4:15	Discussion Period	
Thursday—March 5		
8:30- 9:30	Biological Investigations in Water Pollution Control	C M Tarzwell
9:40-10:30	Aquatic Organisms Related to Pollution	H W Jackson
10:40-11:40	Oxygen Consumed Methods	H P Kramer
11:40-12:00	Objectives for the Laboratory on Oxygen Consumed	D G Ballinger
1:30- 2:00	Laboratory Determination of Oxygen Consumed	Training Staff
2:00- 2:50	Evaluation of Oxygen Consumed Methods	H P Kramer
2:50- 4:30	Laboratory—Determination of Oxygen Consumed	Training Staff
Friday—March 6		
8:30- 9:30	Oxygen Relationships in a Polluted Stream (I)	P D Haney
9:40-10:40	Oxygen Relationships in a Polluted Stream (II)	P D Haney
10:50-11:50	Sampling Methods 1) Samplers 2) Selection of Stations 3) Industrial Waste Sampling	G N McDermott
1:15- 2:05	Industrial Waste Pollution Control	H H Black
2:15- 3:15	Biological Samplers and Sampling Procedures	H W Jackson
3:25- 4:30	The Use and Significance of Indicator Organisms	A R Gaufin
Monday—March 9		
8:30- 9:20	Discussion—Specific Industrial Waste Problems	G N McDermott
9:30-10:20	Germicidal Agents for Water	H P Kramer
10:30-11:20	Bacteria Which Indicate Pollution	H F Clark
11:30-11:50	Bacteriological Examination of Water I	R P Myers
1:00- 1:20	Bacteriological Examination of Water II	R P Myers
1:30- 2:00	Objectives of Bacteriology Laboratory	D G Ballinger
2:00- 3:00	Laboratory Coliform and Enterococcus Determinations	Training Staff
3:00- 4:30	Final B O D on Industrial Waste Samples Final Cyanide Determinations	Training Staff
Tuesday—March 10		
8:30- 9:00	The Problem of Organic Chemicals in Surface Waters and Industrial Wastes	F M Middleton
9:00- 9:30	Organic Aspects of Industrial Wastes	H Braus
9:30-10:00	Application of Modern Techniques to the Investigation of Organic Chemical Pollution	A A Rosen
10:00-10:30	Running Threshold Odor Tests	F M Middleton
10:40-11:40	Pollution Abatement in the Ohio River	E J Cleary
1:15- 2:05	Gauging Problems with Industrial Wastes	G N McDermott
2:15- 3:05	Most Probable Number	R L Woodward
3:05- 3:15	Objectives of Bacteriology Laboratory	L J Kamphake
3:15- 4:30	Laboratory: Coliform and Enterococcus Confirmation	Training Staff
Wednesday—March 11		
8:30- 9:30	Stream and Industrial Waste Surveys	H H Black
9:40-10:40	Practical Example of an Industrial Waste Survey and the Interpretation of the Effect of this Waste on Streams	G N McDermott
10:50-11:50	The Practical Application of Bioassay	H W Jackson
1:00- 1:40	The Membrane Filter	R P Myers
1:50- 2:20	Membrane Filter Demonstration	D G Ballinger
2:30- 3:15	Filtration of Water Samples in the Field	E J Laubusch
3:15- 3:30	Objectives of Bacteriology Laboratory	L J Kamphake
3:40- 4:20	Laboratory—Coliform Confirmation Imvic Tests Demonstration	Training Staff
4:20- 4:30	Membrane Filter Demonstration	D G Ballinger
Thursday—March 12		
8:30- 9:30	Industrial Waste Analysis	H P Kramer
9:40-10:30	Bathing Beach Surveys	A H Stevenson
10:40-11:40	The Practical Application of Biological Surveys	H W Jackson
1:00- 1:50	Water Quality Surveys in Shellfish Growing Areas	R S Smith
2:00- 3:20	The Thomas Slope Method and the Moments Method Application of the Moments Method to the B O D Results Discussion of Results	H P Kramer
3:30- 3:40	Objectives of Bacteriology Laboratory	L J Kamphake
3:40- 4:30	Laboratory—Coliform MPN Imvic Tests—Demonstration	Training Staff
Friday—March 13		
8:30- 9:20	Interpretation of Analytical Data	M B Ettinger
9:30-10:20	Stream Pollution Legislation	Consultant
10:30-11:20	Disposal of Radioactive Wastes	H P Kramer
11:30-12:00	Discussion	
1:30- 4:30	Individual Consultation with Members of EHC Staff Visit to Third and Kilgour Laboratories (Optional)	

NEW PRODUCTS AND DEVELOPMENTS

• New Hart Humectant Said to Be More Effective Than C P Glycerine

Hartexsol C, a new water-white viscous liquid humectant introduced to the trade recently by The Hart Products Corp, New York, is said to be showing approximately 10% greater hydroscoposity than c p glycerine while costing substantially less.

Hart Products outlines the following applications for the new product:

1) in the knit goods trade as an additive in weighting to eliminate dusting and powdering of the weighter and to soften the hand.

2) as a flame resistant treatment to flame-proof paper and other materials.

3) in the textile printing trade as an ingredient of the print paste for vat dyes in order to retain moisture in the ager.

4) in warp sizing to prevent the sized warps from becoming too dry.

5) in starch glues to make the paste smoother and prevent separation of water from the paste caused by contraction of the starch.

6) as a general hydroscopic and plasticizing agent.

• One-bath Scour and Dye System for Nylon Hosiery

Amalgamated Chemical Corporation, Philadelphia, has announced the development of a one-bath scour and dye system for nylon hosiery.

Named the Siddons Process, after Alton P Siddons of Amalgamated's technical staff, the new system is said to offer results equal to conventional two-bath processes without sacrificing production quality. Basically a three-step process of about 90 minutes duration, it uses Evenate OBX as a dye leveling agent and Alkamine OBX for a detergent. The older, two-bath method permitted two loadings per 8-hour day. With the Siddons Process, three loadings are claimed possible.

According to the company, extensive mill tests have shown satisfactory dyeing results. Colors are said to be true and even with excellent union between the multifilament welt and monofilament boot. Dirt and oil are held in solution, preventing "oil lakes" on the finished hosiery, it is stated, and appreciable savings in water, steam and labor have been noted in plants using the new process. Complete technical data sheets are available from Amalgamated Chemical Corporation, Ontario & Rorer Streets, Philadelphia 34, Pa.

• Italian High Pressure Package Dyeing Machine Under Steverlynck Patent

A new high-temperature Package Dyeing Machine, using a closed circulation under static pressure, is being offered by Mezzera S p A, Milan, Italy, through their agents, Ernest L Frankl Associates, 22 East 40th Street, New York, N Y.

This machine is manufactured under the Steverlynck patent and is said to remove most of the inconvenience associated with the package dyeing of many of the newer fibers.

The Mezzera high-temperature Package Dyeing Machine offers dyeing with liquid circulation in a closed circuit under static pressure at temperatures up to 120°C.

A centrifugal pump is said to maintain the complete efficiency even at elevated temperatures due to the internal static pressure by means of which it is possible to overcome the harmful effects of the increased vapor tension and to prevent the liquor from boiling.

In high-temperature dyeing the dispersion of most colors is greatly improved, thus favoring a perfect pentration and resultant uniformity even during a very short dyeing period, it is alleged. It is also claimed that blends, such as wool-nylon, wool-acetate, wool-viscose, etc, can be dyed with common dyes at high temperature with greater ease and a degree of uniformity never before reached.

A small sampling tank, which can be closed from the circuit, permits the checking of shades of the material while the machine is under static pressure. Another tank allows for the addition of colorants and chemicals without interrupting the operation of the machine and without decreasing the static pressure.

The apparatus is provided with a heat exchanger which may also be used for cooling to such a temperature as to allow the machine to be opened when the treatment is complete.

The following economical and technical advantages are claimed:

1) Quickness in handling every fiber and every class of colorant.

2) Perfect dyeing results due to uniform distribution of the dyeing liquors and to the quick penetration, assuring a high degree of uniformity.

3) Great saving in fuel, electric power, dyes and chemicals.

4) Perfect preservation of materials and consequent highest winding output due to the package system, which permits a swelling of the material both longitudinally and radially. This arrangement is said to permit the maintaining of the original position of the yarns, which come out fully undamaged.

5) Versatility of use made possible by carriers of excellent design, permitting the handling with the same advantages of such materials as carded stock and worsted tops, as well as hanks. High-temperature treatment is said to have no harmful effect on wool fibers.

6) Simplicity of operation as the controls, gauges, valves and all other accessories are readily accessible and within hand reach of the operator.

Mezzera has been building these machines for several years and claims to have added many mechanical refinements to the original patent.

A considerable number of these machines have been in successful operation in various European mills and are now offered in this country for early delivery.

• New Lok-Tite Application

An additional application of the Lok-Tite Tag for the textile trade has been announced by the Liberty Marking Tag Co, Inc, Brooklyn, N Y.

Used successfully heretofore in the processing end of the industry, it has now been adopted by many finishing departments as an implement for marking imperfections during the examining of fabrics.

The specially designed rust-proof clip is said to attach instantly and hold fast to the piece without working loose or damaging the goods. The tag itself is available in 10 colors for systematic identification, and may be printed to order.

Examiners are able to prevent the halting of inspection machines and have been able to cast aside more costly and slower methods, i e, sewing in a loop of thread, scotch tapping the edges, etc.

The Lok-Tite method has its particular advantages for those finishing departments who must inspect and mark imperfections as specified by government contract.

• Aulabrite Extender 818-5 Combats Crocking of Pigment Colors

A further reduction of crocking of pigment printing colors has been achieved by Aula Chemicals Inc, Elizabeth, N J, as a result of intensive work which culminated in the development of the new Aulabrite line of pigment printing colors and a special extender, Aulabrite Extender 818-5.

It is stated that roller prints or screen prints extended with Aulabrite Extender 818-5 show little or no dry or wet crocking on cotton, rayon or synthetic fabrics. Dr Laszlo Auer, Aula president, states that the use of Aulabrite Extender 818-5 makes possible prints of outstanding brilliance and depth of shade, which in addition to being crock fast also excel in their resistance to washing and dry cleaning.

• Standard Fabricators Introduces New Pressure Dyeing Machine

American Standard Fabricators Corporation, 355 Walton Ave, New York 51, N Y, have announced the "Steinen" High-Temperature Skein Pressure Dyeing Machine, Model "Gawon" with magazine loading device.

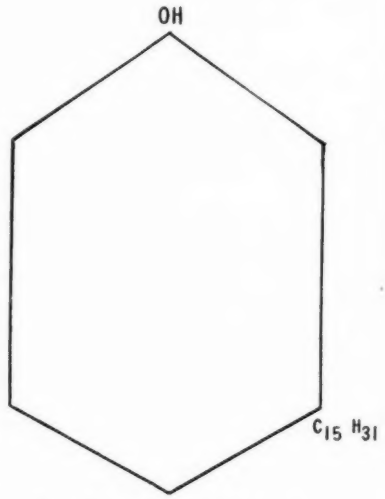
Patented in the United States and abroad, the new machine is designed for use with Orlon, nylon, Dacron and all synthetics and blends at high temperatures as well as conventional dyeing of natural fibers. It is said to produce the highest quality work on fine worsted hand knitting yarns and in vat color processing.

• New Meta-Substituted Phenols

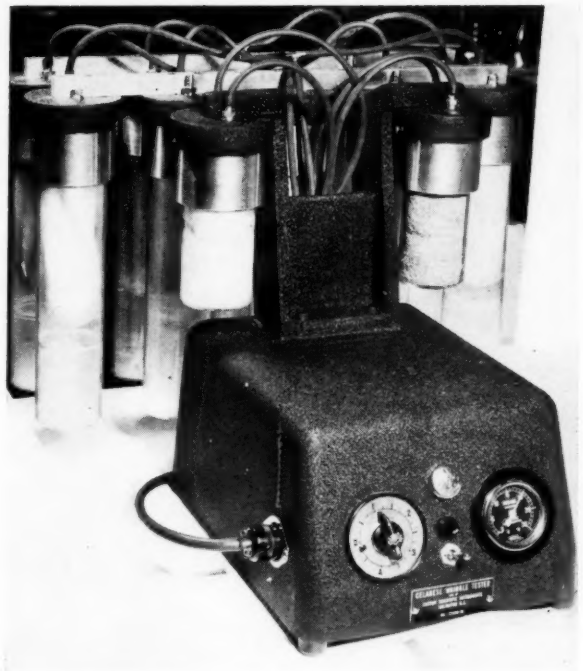
The addition of long chain alkyl groups to dye molecules is known to confer water repellency on fabrics which have been dyed with such modified dyestuffs. The Irvington Varnish & Insulator Company, Chemical Division, Irvington, N J, has recently announced the commercial availability of two phenols which may be used in the production of such dyes. They are meta substituted with 15-carbon alkyl chains.

One phenol, known as 3-Pentadecyl Phenol (Hydrogenated Cardanol) has a flaked waxy appearance, and is pink to white in color. The 5-Pentadecyl Resorcinol (Hydrogenated Cardol) is a white crystalline solid.

The manufacturer has prepared Technical Data Sheets on both.



3 - Pentadecyl Phenol



The Celanese Wrinkle Tester shown here is an important instrument for producing wrinkle patterns on fabric—the first machine of its kind. It is the invention of Dr Reiner G Stoll, assistant manager in charge of Textile Division Applications Research at the Summit, New Jersey, laboratories of Celanese Corporation of America. The machine is being produced commercially by Custom Scientific Instruments, Inc, 541-543 Devon St., Arlington, N J

• Two New Surfactants Introduced by Rohm & Haas

The Rohm & Haas Company is introducing two new surface-active-agents, Triton X-102 and Triton X-138, which are highly concentrated nonionic surfactants based on a synthetic hydrophobe and ethylene oxide.

Triton X-102 is said to meet the need for a detergent having excellent emulsification properties for the waxes and oils which must be removed from rayon and cotton fabrics and yarns before they can be satisfactorily bleached and dyed. In addition, the new product is said to offer improved solubility under the conditions of alkalinity and high temperature which are encountered in these operations.

Triton X-138 offers a solution to the problem of obtaining efficient scouring of raw wool without damaging fine fibers, it is stated. It is applicable to wool, cashmere, alpaca, vicuna, and mohair; it readily emulsifies the wool grease and is effective under less alkaline conditions than previously used materials, it rinses out readily, even at low temperatures, and is not adversely affected by hard water; and it is not substantive to wool (does not leave residues on the wool fiber), thereby giving very high efficiency in the wool carding operation, it is claimed.

Atolene RW; Ampitol 35D

Atolene RW, originally marketed as a wetting and dye-levelling agent, has been found by dyehouses to be an effective lubricant in the prevention of bruises, crow's feet and similar harmful effects in the scouring and dyeing of heavy rayons and acetates, according to Dexter Chemical Corporation, New York.

The unexpected lubrication characteristic of Atolene RW, a sulfated ester of oleic acid, in wet processing proved puzzling to Dexter's laboratory for some time, but detailed investigation is said to have shown it to be due to the fact that it was almost completely sulfated. The high degree of sulfation in Atolene RW apparently is responsible for an absorption of the sulfated ester by the fibers on their surface during dyeing and scouring, and this layer of fatty molecules acts as a lubricating film during wet processing, it is pointed out. Apparently when an ester without a high SO_3 content is used, the fiber does not absorb the ester on its surface, and hence there is no surface lubrication. The high degree of sulfation also increases to a considerable degree the wetting properties of Atolene RW, it is claimed.

Dexter cites the following standard formulas as being used by several plants:

In an 8,000-gallon Hinneken boil-off machine an initial charge of 20 pounds of Strodex D, 10 pounds of sodium phosphate and 20 pounds of Atolene RW are added. During the course of an eight-hour run, a 50-gallon stock solution is fed into the Hinneken machine. The stock solution is made up by mixing 20 pounds of phosphate and 20 pounds of Atolene RW together and bringing the volume up to 50 gallons.

In a 12-foot dye beck, 3 gallons of stock solution as given above are used to scour the rayon. In a 16-foot beck, 5 gallons of the stock solution is used.

In the dyebath, after the goods have been scoured, 3 gallons of stock solution is directly added when a 12-foot beck is used, with 5 gallons of stock solution in a 16-foot beck. Dyeing is continued in the regular manner.

For goods which are especially heavy and which bruise easily, an additional ½% of Atolene RW on the weight of the goods may be added to the dyebath.

Although Dexter claims Strodex D has been proven superior in the stock solution, similar detergents can be used. Sodium pyrophosphates are optional and their use depends on water conditions and on amount of dirt in the goods.

A new finish, Ampitol 35D, which produces a soft, silky hand on acetate, viscose, nylon and other synthetic fibers, improves the cutting and laying up properties and helps to control static electricity, according to Dexter. This substantive softener, cationic in nature, is claimed to resist dry cleaning and washing when applied either in the dye beck as a final rinse or by pad.

• 5 New Fisher Reagents Available

Fisher Scientific Company, 717 Forbes St, Pittsburgh, Pa, has announced the availability of five additional high-quality reagents.

One of the most versatile is *C-551 Cupferron*—an ammonium salt of N-nitrosophenylhydroxylamine — for separating copper and iron, estimating aluminum colorimetrically, precipitating iron quantitatively from strongly acid solutions, analyzing vanadates, titanium, etc. Available in 25, 100 and 500 grams.

A-47 Amino Naphtholsulfonic Acid, important in the manufacture of azo dyes and in 1,2-naphthoquinone-4-sulfonic acid, is available in 25, 100 and 500 grams.

A-295 Sulfamic Acid, used in flameproofing fabrics and as an acidimetric standard, is available in 100 and 500 grams.

P-97 m-Phenylenediamine Hydrochloride, an important reagent for nitrite, is available in 25, 100 and 500 grams.

Old, familiar *Soda Lime* (a mixture of variable proportions of sodium hydroxide with calcium oxide or hydroxide) is now available as an ACS-grade Fisher Certified Reagent, with rigidly controlled drying loss (not over 7% at 200°C) and dust specifications (not over 1%), as well as a CO_2 absorption capacity not less than 25%.

S-195 Soda Lime is 4-8 mesh; *S-196 Soda Lime* is 8-14 mesh. Both are available in 1-lb and 5-lb lots.

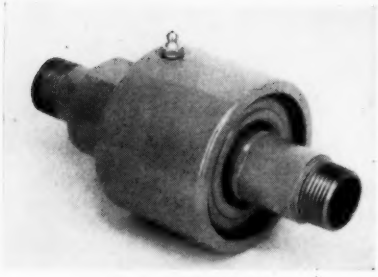
• Long Life, Simple Maintenance Claimed for New Rotary Joint

Long life and maximum performance, with minimum servicing requirement, are said to be built into a newly designed rotary pressure joint introduced by Anco, Inc, Providence, R I. Continuity of operation for exceptionally long periods is predicted, but when the Anco Rotary Joint does eventually need servicing, according to the makers, maintenance is simple and easy because the joint consists of only 14 parts, including all washers, oil rings, etc.

The Anco Rotary joint reportedly will convey steam under pressures up to 350 psi and liquids under pressures up to 3500 psi, while rotating at high speeds. Equipped with a self-adjusting wear take-up, the units have single or double race ball bearings. The self-lubricating rotary seal and its mating part are designed so that efficiency of the sealing members cannot be affected by misalignment or eccentricity up to 10°. An auxiliary seal is said to prevent any loss of grease or condensate past the bearing. It reportedly withstands temperatures from —100° to +600°.

The Anco joint is self-supporting, requiring no external braces, and can be used with or without a syphon. Available in pipe sizes from one-quarter-inch up to five-inch inclusive, it can be supplied to withstand chemical reactions of the materials to be handled. It is stated that the Anco joint is designed to ensure superior performance wherever steam or liquids are to be conveyed under pressure between stationary and revolving units.

A brochure giving full details, is available on request from Anco, Inc, Dept 11, One Baker Street, Providence, R I.



Anco Rotary Joint

• Eastone Brilliant Fast Red 2B-GLF

A new, bright red acetate dye, Eastone Brilliant Fast Red 2B-GLF, recently offered to acetate textile finishers by Tennessee Eastman Company, is claimed to possess a combination of fastness properties and dyeing characteristics unequaled by any acetate red dye now on the market.

Henry L Ford, assistant vice president of the company has stated, "Tests in our development laboratories and evaluations in the field failed to disclose a single weak spot in the over-all characteristics of this new red dye. The cost of manufacture is sufficiently low so that we will be able to offer our customers greater money value than any other fast red or pink acetate dye.

"An analysis of the properties of Eastone Brilliant Fast Red 2B-GLF shows its resistance to atmospheric gas and light fading to be equal to or better than any other acetate red or pink available. No staining results during standard tests for sublimation, perspiration, hot pressing (wet or dry) or dry cleaning and its resistance to wet and dry crocking are excellent.

"The new dye is insensitive to mild alkali and is unaffected by urea-formaldehyde finishing agents. It is highly dispersed and has excellent levelling and exhaustion characteristics in either box or jig at temperatures of from 150°F to 190°F."

Eastone Brilliant Fast Red 2B-GLF is a member of the Eastman GLF or Estron Dye series which is currently being promoted for use in those applications requiring maximum resistance to gas and light.

Tennessee Eastman recommends the use of its new dye for plain dyeing and discharge, screen or application printing.

Detailed information is available upon request to the company at Kingsport, Tennessee.

• Solophenyl Violet B R L

Solophenyl Violet B R L, a recent addition by Geigy Company, Inc, to their Solophenyl line, is said to be one of the fastest-to-light violets currently being offered to the textile industry. Its light fastness is reportedly retained in the presence of T B L Finish, although the shade goes somewhat blue and duller.

The new violet appears to be well adapted for application printing and cotton and rayon with good solubility. It is said to yield a clear free paste free of specks and a resultant print of good fastness to washing.

NAMES IN THE NEWS

R W Hooker

R W HOOKER, vice president in charge of sales of Hooker Electrochemical Company, Niagara Falls, was reelected president of The Chlorine Institute, Inc for the fifth consecutive time, at the Institute's meeting in New York recently. LOUIS NEUBERG, vice president of the Westvaco Chemical Division of Food Machinery & Chemical Corporation, was elected vice president and ROBERT T BALDWIN was elected secretary-treasurer.

Mr Hooker has been a director of the Chlorine Institute since 1940 and prior to his first election to the presidency in 1949, he had served as a vice president.

The Institute engages in the technical promotion of the uses of chlorine, especially in the treatment of water for drinking purposes, and the treatment of sewage and industrial wastes.

THE Rodney Hunt Machine Co, Orange, Mass, has announced the appointment of LANGDON M PHILLIPS, previously field sales manager, to assistant sales manager. Mr. Phillips has been associated with Rodney Hunt for the past four years. He will assist J W REMBE, sales manager, in directing the sales activities of the company's five product divisions in both domestic and export markets. The product divisions of Rodney Hunt are: textile machinery, industrial rolls, process equipment, water control apparatus and water power equipment.

L M Phillips

Before joining Rodney Hunt, Mr Phillips was industrial representative in the Worcester, Mass office of the Shell Oil Company, Inc with which he was associated for seventeen years.

R J Milano

H Beller

D Waller

ROBERT J MILANO, president of the Millmaster Chemical Corporation, New York, and of the Berkeley Chemical Corporation, Berkeley Heights, N J, was elected president of the Salesmen's Association of the American Chemical Industry, at a meeting held in the Hotel Roosevelt, New York, on January 21.

Mr Milano succeeds EDWARD A BUSH of Bush Aromatics Division of the Dow Chemical Company, Midland, Mich. The association is composed of more than 800 members engaged in the sale of chemicals, drugs and allied products.

Other officers elected were WARREN F SCHUMACHER, J T Baker Chemical Company, Phillipsburg, N J, *vice president;* JOHN F HENRY, Adams-Henry Chemical Company, New York, *treasurer;* and EDWARD L COLLINS, Chilean Nitrate Sales Corporation, New York, *secretary.*

Elected to the board of directors for two-year terms were RALPH L ERICSSON, Sumner Chemical Company, Zeeland, Mich; LeROY P LONDON, E I du Pont de Nemours & Co, Inc, Wilmington, Del; GEORGE E KUEHN, Carbide & Carbon Chemicals Division of Union Carbide & Carbon Corporation, New York; HARRY P SMITH, Mathieson Chemical Corporation, Baltimore, Md, and WALTER T JOHNSON, Columbia-Southern Chemical Division of Pittsburgh Plate Glass Company. Elected for one year was VINCENT L REBAK, recently resigned from Heyden Chemical Corporation, New York.

EVERETT PETERSON of Westfield, N J, has been named wage and salary administrator of the General Aniline & Film Corporation, New York. He had been wage and salary supervisor of the Corporation's Grasselli plant in Linden, N J, for three years. Prior to joining GAF he had been with National Dairy Co, Philadelphia.

* * * *

At the Graselli plant, HANS BELLER has been appointed manager of the recently established Process Engineering Department and Semi-Works. Dr Beller was formerly manager of the Special Products and the Sulphur Colors-Textile Auxiliaries Area. He held the post of technical director of the New Fields Department prior to his latest appointment.

Seven other employees have been transferred to administrative posts in the new department, which has been organized to coordinate operations and to increase operating efficiency. They include WALTER N ALEXANDER, supervisor, Planning Section; FREDERICK GROSSER, supervisor, Laboratories Section; ROBERT M VERBURG, supervisor, Semi-Works; and CLYDE McKINLEY, superintendent, Process Engineering Section. CHARLES F MONTROSS and HERMAN H TIEDEMANN have been named supervisors under Dr McKinley, Mr Montross in the Process Evaluation Group, and Mr Tiedemann in the Development Group.

It also has been announced that ROY S MARTIN has been named production supervisor of the Carbonyl Iron Section of the Sulphur Colors, Textile Auxiliaries and Carbonyl Iron area.

H C FISHER has joined the sales force of F W Warrington Company, Charlotte, N C, southern sales representatives for a number of textile machinery builders. He will be associated with F W WARRINGTON and GEORGE W DUDLEY, JR, in covering the Southeast for Fletcher Works, Inc, and National Drying Machinery Company, Philadelphia; Turbo Machine Company, Lansdale, Pa, and Riggs and Lombard, Inc, Lowell.

Mr Fisher started his career with American Enka Corporation, Enka, N C, as a laboratory technical assistant, and for a period was sales engineer for Tidewater Supply Co, Inc. From 1950 until he became associated with F W Warrington Company, Mr Fisher was assigned to the textile branch of the Quartermaster Board at Fort Lee, Virginia, where he was engaged in the field of testing experimental military fabrics.

DAN WALLER, formerly associated with the Philadelphia Hosiery Mills, Philadelphia, Tenn, has joined the staff of Mac Chemical Company, Knoxville, Tenn, as technical and sales representative.

Mr Waller, who has had wide experience in dyeing, bleaching and finishing, will service and call on mills throughout Tennessee, Georgia and Alabama.

M E Bretschger, president of the Buffalo Electro-Chemical Company, Inc, a Division of Food Machinery and Chemical Corporation, has announced three promotions in the engineering department. G G CREWSON, formerly chief engineer has been appointed director of engineering. J N VERMILYA succeeds him as chief engineer and CHARLES M STANDART has been appointed assistant to the chief engineer.

Other engineering department supervisory personnel include: G NACHBAUR, works engineer; J R RYAN, supervisor of engineering development; J A BERGANTZ, project engineer; and N S DAVIS, JR, manager of special projects.

D Y MILLER, chemical engineer of Celanese Corporation of America has been assigned to the Market Development Department of the Textile Division, and will shortly move to the Charlotte, N C, office.

Mr Miller joined Celanese in 1938, and for 7 years was affiliated with the Research and Development staff at the Cumberland, Maryland, plant. He came to the New York office in 1945, and in recent years was engaged in technical control work.

H B BARTLEY, JR, N G BAKER and M HENRY JAMISON have joined the sales staff of Celanese's Chemical Division. Mr Bartley, who was with the company before a tour of duty with the Chemical Corps, and Mr Baker, formerly with the Enjay Company, are assigned to the New York office. Mr Jamison, previously with Dearborn Chemical Company, is attached to the Chicago office.

Ambrose R Chantler, who recently retired after 34 years with the Du Pont Company. (See page 89 of the February 2nd issue, ADR)

KENNETH R FOX has joined Fabric Research Laboratories, Inc, Boston, Massachusetts, as Vice President and a member of the Board of Directors. He resigned his position as Vice President and Technical Director of Burlington Mills Corporation on February 1.

It is pointed out by Walter J Hamburger, Director of the Boston laboratories, that Mr Fox will be in charge of a newly created development group, the purpose of which is "to provide a service which will make better use of laboratory product and process research findings and to adapt them to serve the textile and allied industries in a more useful and productive fashion."

Prior to joining Burlington Mills, Mr Fox was president of Lowell Textile Institute for five years.

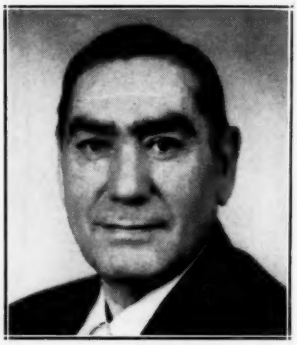
R LINDLEY MURRAY, President of Hooker Electrochemical Company, was awarded honorary membership in the American Institute of Chemists on February 4. Mr Murray is the 46th recipient of honorary membership in the Institute since its founding in 1924.

Honorary membership in the American Institute of Chemists is awarded to persons who, by their work, advance chemistry as a profession. Mr Murray's citation read:

"Outstanding leader in research and development in the chemical industry who was devoted to skillful and sympathetic human relations with his professional associates particularly in the line of training and guidance of younger men who with him have made outstanding contributions to the chemical industry."

Presentation of the award was made at the Hotel Niagara in Niagara Falls by LINCOLN T WORK, AIC president.

S B Carson



R E Beauregard

STACY BOYD CARSON and ROY E BEAUREGARD, textile finishing experts, have joined Dan River Mills, Inc.

Mr Carson has been made assistant superintendent of the company's finishing operations at its Schoolfield plant, and Mr Beauregard has been named night superintendent of the same operations. They join JOHN J NEWTON, recently appointed superintendent.

Mr Carson has been serving as consultant on finishing to Dan River since November. He has 25 years experience in textile finishing and served as manager of J P Stevens finishing plant at Wallace, S C for ten years. Previously, he had been general superintendent of finishing with the Riegel Textile Corporation of Ware Shoals, S C and had been with the Sayles Biltmore Bleachery of Biltmore, N C, and S Slater and Sons at Webster, Mass.

Mr Beauregard has 32 years experience in textile finishing and comes to Dan River from Acabado Loudres Company of Bolderas, Mexico. He was formerly associated with Textile Morelos of Cuernavaca, Mexico; Fairforest Finishing Company of Spartanburg, S C, Aberfoyle Manufacturing Company of Chester, Pa, and Stillwater Mills of Harrisville, R I.

THE appointment of two textile industry executives as instructors in the textile unit of the City College of New York Midtown Business Center was announced on January 23rd by Robert A Love, Director.

The addition of LEONARD KOCH, sales and production manager, Davis Screen Plant, United Merchants & Manufacturers and ROBERT NIRENBERG, Member, Commodity Standardization Board, Armed Services Textile & Apparel Procurement Agency, to the staff is part of the current expansion of the Midtown Business Center's textile unit.

OBITUARY

B V MORRISON

FUNERAL services were held on January 27th in Mackinaw, Ill, for Mrs Bess Viemont Morrison, 54, head of textiles and clothing research division of the Bureau of Human Nutrition and Home Economics, U S Department of Agriculture. Mrs Morrison had conducted, planned and directed research on textiles since 1928.

She is survived by her father, John M Viemont of Takoma Park, Md.

FRANK J SODAY, director of the Research and Development Department, The Chemstrand Corporation, has announced several new personnel moves.

On December 19th, he announced the appointment of JAMES S TAPP as a group leader, to be assisted in polymer studies by H DEWEY DeWITT, W A HOOPER HUFFMAN and KENNETH R LEA.

On January 16th he announced the following appointments within the Central Research Laboratories; AUBREY R McKINNEY—group leader of physical chemistry; WALTER C CARTER; THOMAS H GUION, JAMES M MILLS and ROBERT H HEIDNER.

Dr Tapp has served in supervisory capacities with three Canadian firms; Dr DeWitt has been with Southland Paper Mills and Du Pont; Dr Huffman was a research chemist with the U S Department of Agriculture's Bureau of Agricultural and Industrial Chemistry; and Dr Lea was a professor at McMurray College.

Dr McKinney's most recent affiliation was with the National Aniline Division, Allied Chemical & Dye Corp; Dr Carter was a professor of textile chemistry at Georgia Tech and Oglethrope University; Dr Guion was an associate professor of chemistry at Clemson College; Dr Mills was a research chemist with Kaiser Aluminum Company; and Mr Heidner comes from Monsanto Chemical Company.